AD NUMBER

AD828772

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies and their contractors; Administration/Operational use; Feb 1968. Other requests shall be referred to Air Force Materials Laboratory, Wright-Patterson, AFB OH 45433.

AUTHORITY

AFML, USAF ltr, 12 Jan 1972

AFML-TR-68-34

MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS CORROSION CRACKING, OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

D. J. Brownhill, R. E. Davies and D. O. Sprowls
Aluminum Company of America

TECHNICAL REPORT AFML-TR-68-34

FEBRUARY 1968

Air Force Materials Laboratory
Research and Technology Division
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio

NOTICES

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Air Force Materials Laboratory (MAAM), Wright-Patterson Air Force Base, Ohio 45433.

Information in this report is embargoed under the Department of State ITIAR. This report may be released to foreign governments by departments or agencies of the U. S. Government subject to approval of Air Force Materials Laboratory, Materials Applications Division or higher authority within the Air Force. Private individuals or firms require a Department of State Export license.

Copies of this report should not be returned unless return is required by security considerations, contractual obligations, or notice on a specific document.

MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS-CORROSION CRACKING, OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

D. J. Brownhill
R. E. Davies
D. O. Sprowls

FOREWORD

This investigation was conducted by the Alcoa Research Laboratories, Aluminum Company of America, under USAF Contract No. AF33(615)-3580, Project No. 7381, "Materials Applications", Task No. 738106, "Materials Information Development". The work was under the direction of the AF Materials Laboratory, Research and Technology Division, Wright-Patterson Air Force Base, Ohio, with Mr. Clayton L. Harmsworth as project engineer.

This report covers work done from March 1966 to January 1968.

The investigation was made under the supervision of Mr. D. J. Brownhill, with Mr. R. E. Davies as project leader for the phase covering the mechanical properties including fracture toughness and fatigue, and Mr. D. O. Sprowls as project leader for the phase covering the resistance to stress-corrosion cracking. The statistical analyses were made by Messrs. W. P. Goepfert and J. H. Clouse. Significant advisory and technical assistance were supplied by Messrs. J. G. Kaufman, G. W. Stickley and J. D. Walsh.

The manuscript was released by the authors for publication as a Technical Report.

This technical report has been reviewed and is approved.

D. A. SHINN
Chief, Materials Information Branch
Materials Applications Division
AF Materials Laboratory

ABSTRACT

The tensile, compressive, shear, bearing, fracture-toughness and axial-stress fatigue properties and resistance to stress-corrosion cracking have been determined for a total of 143 lots of commercially produced 2014, 2024, 6061, 7075, 7079 and 7178 extrusions in stress-relieved stretched tempers (TX51X), and in thicknesses from 0.050 to 6.500 in.

Tests of 34 lots in the "heat-treated-by-user" tempers were also made.

Ratios of tensile, compressive, shear and bearing properties to corresponding longitudinal tensile properties were computed. Some variations in ratios occur with respect to alloy, temper, thickness, and direction.

Groups of ratios for each alloy in the TX51X tempers were analyzed statistically and minimum-average values were determined. Tables of design mechanical properties were prepared.

Typical and minimum stress-strain and compressive tangent-modulus curves were prepared.

Average values of plane-strain stress-intensity factor, K_{Ic}, at 5 per cent secant offset were determined.

Log-mean fatigue-life values were calculated.

Stress-corrosion tests evaluated performance for the alloy and temper combinations tested.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont)

LIST OF ILLUSTRATIONS (Cont)

LIST OF ILLUSTRATIONS (Cont)

LIST OF ILLUSTRATIONS (Cont)

LIST OF ILLUSTRATIONS (Cont)

LIST OF ILLUSTRATIONS (Cont)

SECTION I

INTRODUCTION

The desirability of stretching heat-treated aluminum alloy products, not only for straightening, but also to reduce residual stresses and warpage during subsequent machining operations, has been recognized in recent years by the establishment of the TX51-type tempers. It is realized, however, that this stretching may have a significant effect on some of the mechanical properties, particularly a reduction of the compressive yield stress in the longitudinal direction. The mechanical properties of stress-relieved stretched plate were evaluated in a previous investigation (1).

The data from tests made under this investigation were obtained to establish design mechanical properties for use in MIL-HDBK-5(2), including stress-strain and tangent-modulus curves, for 2014, 2024, 6061, 7075, 7079 and 7178 aluminum alloy extrusions in the TX51X tempers. For comparison, similar tests have been made of a few extrusions of each alloy in "heat-treated-by-user" tempers.

It is recognized that the fracture-toughness, fatigue properties and resistance to stress-corrosion cracking are among the most important properties contributing to the success or failure of specific aircraft structures. These properties have been evaluated in previous investigations of stress-relieved stretched plate (3, 4) and as part of this investigation they have been evaluated for a selected number of extrusions.

SECTION II

MATERIAL

The samples of extrusions tested were obtained from lots produced on regular orders for customers between May 1966 and July 1967. No two lots of any one alloy and temper were from the same production run. However, the samples of 2024-T851X were from the corresponding lots of 2024-T351X and most of the 7075-T73510 samples were from corresponding lots of 7075-T6510 samples.

The samples of extrusions were obtained from two producers. About 70 per cent of the total number of samples tested were obtained from one producer.

The number of samples ordered from the two producers was 176 in the TX51X tempers and 34 in the O temper. The test program was based upon the expectation that about 2/3 of this total number could be obtained. The number of samples received was 143 in the TX51X temper and 23 in the O temper. Because of inevitable fluctuations in customer orders, the desired number of samples could not be obtained for alloys such as 2014 and 7079, whereas for 6061-T6510, all samples ordered were obtained.

The thicknesses ranged from 0.050 to 6.500 in. Lengths were 5 to 8 feet except those of the 2024-O and 7075-O which were 12 to 16 feet in length. The latter samples were cut in half for heat-treatment to the "heat-treated-by-user" tempers, T42 and T62 tempers for 2024 and T62 and T73 tempers for 7075. The temper designation, T73, is not strictly correct for "heat-treated-by-user", but a suitable number has not yet been assigned.

The 23 samples in the O temper were heat treated to the "heat-treated-by-user" tempers in accordance with MIL-H-6088D. The five samples of 2024-O and six samples of 7075-O were tested in two "heat-treated-by-user" tempers, so that the total number of samples tested in those tempers was 34.

Cross-sections of all the samples tested showing the general locations of the test specimens are shown in Figs. 1 through 9.

SECTION III

PROCEDURE

A. Mechanical Properties

A.1. Tensile, Compressive, Shear and Bearing

All tensile, compressive, shear and bearing tests were made using the smallest suitable range of an Amsler 20,000-lb (type 10S2BDA58), an Olsen Electomatic 30,000-lb, or a Southwark-Tate-Emery 50,000-lb Universal Testing Machine. Each of these machines was calibrated prior to and during the life of this contract. The accuracy was always within that required by ASTM(5) and applicable Federal specifications.

Single tests were made except in a few instances where a review of the results indicated that check tests were needed.

All tensile tests were made in accordance with ASTM Methods E8(6). The size and type of the tensile specimens are as shown in Fig. 10. Longitudinal and long-transverse specimens were taken from the following locations:

Thickness, in.	Location of Axis of Specimen with Respect to Thickness (T) and Width (W) of Predominant Section: Thickness	Width: ≤1.500 in.	Width: >1.500 in.
< 0.500	T/2	---	---
0.500 to 1.500 incl.	T/2, D*/2	W/2, D*/2	W/4
>1.500	T/4, D*/4	---	W/4, D*/4

* For round sections: D=diameter.

Also, for section thicknesses ≥ 0.500 and widths > 1.500 in., longitudinal and long-transverse specimens were taken at the T/2, W/2 location. For round sections > 1.500 in. in diam, specimens were also taken at the D/2 location. For sections ≥2.000 in. in thickness, short-transverse specimens were taken from the T/2, W/2 location.

Whenever possible, the tensile specimens from extrusions 0.499 in. or less in thickness were full-thickness sheet-type specimens. The specimens from thicker shapes were 1/2 in. in diam, except where it was necessary to use subsize round specimens.

All compressive tests were made in accordance with ASTM Methods E9(7) and were made using a subpress (Fig. 3 of ASTM Methods E9). The specimens from shapes less than 0.500 in. in thickness were full-thickness specimens of the type shown in Fig. 11. These specimens were laterally supported by a Montgomery-Templin Fixture (Fig. 4a of ASTM Methods E9). The specimens from thicker shapes were cylindrical (Fig. 11). The compressive specimens were taken from the same locations as the tensile specimens.

Tensile and compressive yield stresses of each sample of extrusion were determined from load-strain diagrams obtained autographically.

Tests to determine the shear ultimate stress were made using specimens shown in Fig. 11. Whenever possible, these specimens were taken from the same locations as the tensile specimens, except that tests of short-transverse specimens were made only on shapes 3 in., or more, in thickness. The tests were made with an Amsler double-shear tool in which the center 1-in. length was sheared from the 3-in. long specimen, the end thirds being supported throughout the length. In tests of longitudinal and long-transverse specimens, the loads were applied in the direction normal to the major surface of the shape from which the specimens were taken; in tests of short-transverse specimens the loads were applied in the direction of extrusion, parallel to the major surface of the shape(8).

Bearing tests were made in accordance with ASTM Method E238(9) using longitudinal and, where possible, long-transverse specimens, of the types shown in Fig. 12. Flatwise and edgewise specimens were tested from shapes of suitable size. Edgewise specimens from shapes less than 1-1/2 in. in thickness, however, were 1 in. wide (Type A, Fig. 12). The bearing ultimate stresses and yield stresses were determined at edge distances of 1.5 and 2.0 times the pin diameter. The yield stress was determined as the stress at a permanent deformation of 2 per cent of the pin diameter, as indicated on autographic load-deformation diagrams. Before making these tests, the test fixtures and specimens were cleaned ultrasonically in a suitable nontoxic solvent.

Certain samples were chosen for tensile and compressive stress-strain and modulus tests, fatigue and fracture-toughness tests. Samples from which both longitudinal and long-transverse specimens could be obtained were selected for these tests. In a few instances, however, the geometry of the shapes in certain thickness ranges permitted only longitudinal tests.

The tensile and compressive specimens used for modulus and stress-strain tests are shown in Figs. 13 and 14, respectively. In all modulus tests of longitudinal tensile specimens, and a few long-transverse specimens, strains were

measured over a 6-in. gage length with an Amsler-Martens mirror-type extensometer (ASTM Class A). In most of the tests of long-transverse tensile specimens it was necessary to use smaller specimens and measure strains over a 4 or 2-in. gage length with the Amsler-Martens mirror-type extensometer (ASTM Class B-1) or a 1-in. gage length with the Tuckerman optical strain gage (ASTM Class A). In tests to determine modulus where strains were measured over a 6 or 4-in. gage length, the specimens were stressed up to about the proportional limit; then, after removal of the load and starting again at zero stress and strain, strains were measured with the same instrument over a 2-in. gage length to determine the stress-strain curve to the yield stress. In tests to determine modulus and stress-strain curves where strains were measured over a 2 or 1-in. gage length, tests were continued without interruption beyond the proportional limit to obtain the yield stress. In some tests of each alloy and temper, strains were measured beyond the yield stress to the ultimate stress with a 2-in. dial gage (each division = 0.001 in.) or scale and dividers to obtain full-range tensile stress-strain curves. In all compressive modulus and stress-strain tests, the Tuckerman optical strain gage was used over a 2 or 1-in. gage length (ASTM Class A). For determination of each modulus value, the data were examined by the strain-deviation procedure in ASTM Method E111(10). Based on the various tests, representative typical and minimum stress-strain and compressive tangent-modulus curves were developed in accordance with the procedures as outlined in Sections 3.2.3, 3.2.5 and 3.2.6 of Technical Report AFML-TR-66-386(11).

A.2. Fracture Toughness

Fracture-toughness tests were made in accordance with the methods described in ASTM STP 411(12) on fatigue-cracked single-edge notched tensile specimens from the longitudinal and long-transverse directions. The types of specimens are shown in Fig. 15; the proportions of these specimens are the same as those of specimens used by NASA, Lewis Research Center. The fracture parameters were calculated from relationships developed from the NASA calibration.

Fatigue cracking of the fracture toughness specimens was accomplished by axial-stress or flexural loading at maximum stresses equal to or less than twenty per cent of the tensile yield stress of the material. In some cases, a small number of cycles at higher stresses were used to initiate the fatigue crack, but most of the crack growth was developed at stresses within the above limitation. The fatigue cracks were extended at least 0.050 in., and usually much more, so that the total slot-plus-fatigue-crack length was between 1/3 and 1/2 the specimen width, and always equal to or greater than the specimen thickness.

After fatigue cracking, the specimens were loaded statically in a 30,000-lb Olsen screw-powered testing machine or, for the larger specimens, a 300,000-lb Amsler hydraulic testing machine. Autographic load-deformation curves were plotted with a Mosley X-Y plotter, plotting load from a load-cell or the weighing system of the machine versus the output from SR-4 electrical-resistance strain gages mounted across the edge crack in the specimen, as shown in Fig. 16.

Candidate values, K_Q, of the critical plane-strain stress-intensity factor, K_{Ic}, were calculated using two values of load from the autographic load-deformation curves. The first value was calculated using the load at the initial burst of unstable crack growth, as indicated by the initial significant deviation from linearity in the load-deformation curve. The second value was calculated using the load at a 5 per cent secant offset, equivalent to about 2 per cent of crack extension; this was done as a result of recent recommendations of ASTM Committee E-24(13) that the secant-offset method be considered for establishing K_{Ic}.

Before values of K_Q can be considered to be meaningful values of K_{Ic}, they must meet two criteria:

(a) the plastic zone size must be small with respect to the thickness, as indicated by the limitation that the thickness of the test specimen must be equal to or greater than 2.5 times the ratio $(K_Q/\sigma_{ys})^2$, and

(b) any deviation from linearity in the load-deformation curve prior to the load used for the K_Q calculation must primarily represent crack extension, as indicated by the limitation on the load-deformation diagram that the horizontal displacement of the load-deformation curve (from the initial slope) at a load 80 per cent of that at the 5 per cent secant-offset intercept shall not be more than 1/4 of the displacement at the 5 per cent secant-offset intercept (14).

The straightness of the fatigue-crack front was also used in establishing whether or not the values of K_Q were meaningful values of K_{Ic}. Those values from specimens in which the fatigue-crack-front curvature (measured by the distance from the most advanced point to the trailing point on the crack front) exceeded 20 per cent of the specimen thickness were not considered meaningful.

A.3. Axial-Stress Fatigue

Axial-stress fatigue tests were made using three longitudinal and three long-transverse specimens of the type shown in Fig. 17 from each of the selected samples. They were tested at three stress levels (R=0.0) in Krouse fatigue machines operating at 800, 1500 or 1725 rpm.

B. Stress-Corrosion Cracking

Two types of test specimens were employed; 0.125-inch diameter tensile specimens taken in both the longitudinal and long-transverse directions and 0.750-inch diameter short-transverse C-rings. The specimens were generally taken on center line (T/2) and at mid-point in the width (W/2) of the predominant section of the extruded shape.

The tensile specimens were stressed in "constant-strain" type fixtures (Fig. 18) to 75 per cent of the tensile yield stress by means of the loading device shown in Fig. 19(15). During exposure the fixtures were protected by a cellulose acetate coating so that only the test specimens were exposed.

The C-ring specimens (Fig. 20) were used to test the short-transverse direction of all samples that were 0.750 inches or more in thickness. Stresses equivalent to 75 per cent of the actual short-transverse tensile yield stress were employed; the stress was controlled by tightening the bolt and measuring the resultant deflection by the procedure described in Method 2-A given in the report of Task Group I on Stress Corrosion Testing Methods(16).

The two types of stressed specimens were exposed to the alternate immersion test which employs a 3.5 per cent (by weight) NaCl solution made with salt of 99.7 per cent purity. New Kensington tap water, which is essentially free of heavy metals, was used due to the large volume of water required. Water loss due to evaporation was compensated by the additions of tap water, and the salt concentration was regularly checked and adjusted as necessary. The solution was changed monthly and at each change the specimens were rinsed with fresh tap water.

The alternate immersion cycle included total immersion of specimens for 10 minutes and aeration above the solution for 50 minutes. This 1-hour cycle was continued 24 hours a day for the entire test period. The test equipment, shown in Fig. 21, consists of large stationary painted aluminum alloy tanks, with the specimens supported on an open aluminum alloy (6061-T6) framework that is raised and lowered to provide the alternate immersion cycle.

The alternate immersion test was conducted at ambient temperature and humidity. Measurements have shown the air temperature to vary considerably, while that of the solution varied only slightly. Measurements have also shown that the temperature of the test specimens themselves will remain within 2 to 3 degrees of the solution temperature throughout the drying cycle. For the contract period the range of ambient conditions can be broadly grouped into two categories: warm months when little or no room heating was used versus cold months when room heaters operated more or less continuously. Typical ranges are:

May to September:	air temperature . . 68 to 90° F
	solution temperature . . 64 to 72° F
	relative humidity . . 35 to 70%
	(approximate mean 40 to 55%)
October to April:	air temperature . . 62 to 78° F
	solution temperature . . 58 to 68° F
	relative humidity . . 25 to 60%
	(approximate mean 40 to 55%)

All specimens that failed during exposure were inspected, and representative failures were examined microscopically to verify the cause of the failure. In addition, the tensile specimens that did not fail during exposure were tension tested to determine the change in ultimate tensile stress due to corrosion.

The samples evaluated in this investigation included alloy-temper combinations developed to provide virtual immunity to stress-corrosion cracking, as well as alloy-temper combinations which have been shown to be susceptible to stress-corrosion cracking. It was realized that any cracking that might occur in the more resistant items could be very fine and not readily detectable by visual means, and could result in a degree of relaxation of applied stress, thereby preventing further cracking. Therefore, C-ring specimens from these resistant materials were examined metallographically upon completion of the 84-day exposure period.

SECTION IV

RESULTS OF TESTS

Tables of the results of the individual tensile, compressive, shear and bearing tests, the ratios among some of those results, statistical analyses of the ratios among certain properties and computed design values are arranged as shown in the List of Tables. Stress-strain and compressive tangent-modulus curves are shown in Figs. 22 through 64.

The results of fracture-toughness tests are shown in Tables LXIV and LXV. The results of the axial-stress fatigue tests are shown in Tables LXVI and plotted in Figs. 65 through 71.

The results of the stress-corrosion tests are shown in Tables LXVII and LXVIII.

SECTION V

DISCUSSION OF RESULTS

A. Mechanical Properties

A.1. Tensile, Compressive, Shear and Bearing

The results of the tensile, compressive, shear and bearing tests of the individual samples are summarized in Tables II through X. The tensile properties (longitudinal, specification location) of each sample exceeded the specified minimum values shown in Table XI.

The ratios among the tensile, compressive and shear properties of the individual samples are shown in Tables XII through XX and the ratios of bearing properties to the tensile properties are shown in Tables XXI through XXIX. The most distinct differences between the ratios for the stretched and "heat-treated-by-user" extrusions are in the longitudinal compressive yield-tensile yield ratios and some of the bearing yield-tensile yield ratios. The largest differences are in those of the solution heat-treated tempers of 2024 (T42 vs T351X).

For the purpose of making the statistical analysis of the TX51X tempers of each alloy, ratios of the properties at the specification location in the cross section were used; for the long-transverse direction, the ratios of the long-transverse properties at the center of the cross section (T/2, W/2) to the longitudinal tensile properties at the specification location were used. The statistical analyses were made using the procedures as outlined in MIL-HDBK-5 Guidelines for Presentation of Data(11).

A regression analysis of each group of ratios was made to determine if a significant correlation existed with section thickness. Where a significant correlation with the thickness existed, values of minimum average ratios ($\bar{R}$) were selected which correspond with the lower limit of the confidence band around the regression line at the mean of each respective thickness range. Where no correlation existed, a single minimum value of $\bar{R}$ was selected for all thicknesses. These values of minimum $\bar{R}$ were used for determining derived design values for their respective thickness ranges.

The distribution of the ratios, and the values for the different terms in the statistical analysis, are shown in Tables XXX through XXXVII. The results of the statistical analyses indicate that, with the exception of those for 2024-T351X, there is no correlation of ratios involving the

longitudinal compressive yield stresses with thickness. Similarly, most of the ratios for 2024-T851X and 7079-T6510 indicate no correlation with thickness; for the latter, however, only samples in the smaller thickness ranges were tested. Otherwise, there is generally a decrease in most of the ratios with an increase in thickness for the remaining alloys and tempers.

Since shear and bearing tests were made using both longitudinal and long-transverse specimens, Student's "t"-test was applied for each alloy to the ratios for each test direction to determine if there was a significant difference between average ratios for the two directions. Where none was found, the ratios for the two directions were combined for computation of the minimum ratio values to be used; where there was a significant difference, generally, the more conservative values of the two were used. No differences with direction were found in shear ratios for 2014-T6510, 2024-T351X, 6061-T6510 and 7079-T6510 and all bearing ratios except the bearing yield ratios of 2024-T351X (e/D=2.0) and 6061-T6510 (e/D=1.5).

The values of ratios used in computing derived design values from the specified longitudinal tensile properties of the respective thickness ranges of each alloy are summarized in Tables XXXVIII through XLV. The corresponding computed design values for each alloy are summarized in Tables XLVI through LIII.

In preparing the design tables, the values for the longitudinal tensile properties in Federal Specifications, as shown in Table XI, were used as basis-property "A" or "S" values. These values, and the corresponding "B" values, are the same as shown in MIL-HDBK-5, as revised November 1967. By applying the minimum ratios in Tables XXXVIII through XLV to the basis-property values, the corresponding design values were computed(11). Sufficient supporting production data for 6061-T651X extrusions were available to establish basis-property "B" values. These values and the derived values are shown in Table XLIX. No changes have been made in any minimum elongation values presently shown in MIL-HDBK-5.

In the tables of computed design properties almost all of the derived values have been changed from what is presently shown in MIL-HDBK-5. The differences between the computed values and those now in MIL-HDBK-5 are shown in parentheses in Tables XLVI through LIII. The lower values for most of the shear stresses may be explained partly by the fact that the loads in the shear tests, in this investigation, were applied normal to the major surface of the extrusions, whereas in previous tests the loading direction was not controlled. All but seven of the bearing design values changed, about

three-fourths of the changes being increases. These probably result principally from the fact that the specimens and test fixtures were cleaned prior to testing(9) which has a significant effect on the results(17). The derived tensile and compressive values are not consistently higher or lower than those in MIL-HDBK-5. For some of the alloys it is noted in MIL-HDBK-5 that for the TX51X tempers the longitudinal compressive values may be lower than the values shown. The derived longitudinal compressive values for 2014-T651X and 2024-T351X are 1000 to 4000 psi lower and those for the 6061 and 7000 series alloys are 1000 psi lower to 5000 psi higher than shown in MIL-HDBK-5. A comparison of the statistically-derived minimum ratios from this investigation and the average ratios derived from present MIL-HDBK-5 values for the TX51X tempers can be made from Table LIV through LIX. Also shown in these tables are the corresponding values for extrusions in the "heat-treated-by-user" tempers.

Ratios of the longitudinal and long-transverse properties at the center (T/2,W/2) location in the cross sections of the extrusions to the corresponding properties at the midway (T/2,W/4 or T/4,W/4) location are shown in Table LX for the TX51X and "heat-treated-by-user" tempers. The ratios are generally about the same regardless of alloy, temper, thickness, property or direction of specimen. Generally, the ratios indicate that the properties at the center location for each alloy and temper average from about the same to 3 per cent lower than the corresponding properties at the midway location.

Ratios of bearing properties obtained in tests of edgewise specimens to those obtained with flatwise specimens for sections equal to or greater than 1 in. in thickness are shown in Table LXI. Generally, the ratios for most of the alloys and tempers are about the same. The ratios of bearing ultimate stresses, edgewise to flatwise, average 0.96 and 0.97, respectively, for e/D=1.5 and 2.0; for bearing yield stresses the corresponding ratios average, respectively, 0.97 and 0.98. However, for bearing ultimate stresses of 7075-T6510, e/D=1.5, the ratios average 0.93 and those for 7178-T6510 and -T62, e/D=1.5 and 2.0, the ratios average 0.88 and 0.94, respectively.

The results of the tensile and compressive stress-strain tests are summarized in Table LXII and the average modulus values are shown in Table LXIII.

In the results of the modulus tests, there are no consistent differences in the values for the TX51X and "heat-treated-by-user" tempers. There are, however, noticeable differences between some of the longitudinal and long-transverse values. For the 2000 series alloys the long-transverse tensile

values average about 200,000 psi lower and the long-transverse compressive values average about 60,000 psi higher than the corresponding longitudinal values. For the 7000 series, the longitudinal and long-transverse tensile values average about the same; the long-transverse compressive values average 200,000 psi higher than the longitudinal values. For 6061 there are inconsistent differences in the two directions; for relatively thin sections both the long-transverse values average about 200,000 (tensile) and 400,000 psi (compressive) higher than the corresponding longitudinal values; for the relatively thick sections the long-transverse tensile values are about 200,000 psi lower than the longitudinal values and in compression they are the same.

There were no significant differences in modulus values associated with thickness for the 2000 and 7000 series, however, there were definite differences between the modulus values of the relatively thin (0.075 to 0.375 in.) and relatively thick (3.000 to 6.500 in.) 6061 extrusions. The modulus values of the thick sections average about 600,000 psi higher than the thin sections. These differences probably result from the fact that the thin sections are largely recrystallized, whereas the thick extrusions are largely unrecrystallized.

The tensile and compressive modulus values selected for the various alloys are:

Alloy or Series	Thickness, in.	Modulus, psi Tensile	Modulus, psi Compressive
2000	All	10,800,000	11,000,000
6061	≤ 0.499	9,700,000	9,900,000
6061	≥ 3.000	10,300,000	10,600,000
7000	All	10,400,000	10,700,000

The values for the 2000 and 7000 series are generally higher than those now shown in MIL-HDBK-5 and in the same range as those obtained in a previous contract on stress-relieved stretched plate(1). The above modulus values are shown in Tables XLVI and LIII and were used in preparation of the stress-strain and tangent-modulus curves. The values shown in Table XLIX for 6061, 0.500 to 2.999 in., are those presently shown in MIL-HDBK-5, November 1967; for the typical stress-strain and tangent-modulus curves of 6061-T62 (all thicknesses) averages of the values shown above (10.0 and 10.2×10^6 psi) were used.

The tensile and compressive stress-strain and the compressive tangent-modulus curves are shown in Figs. 22 through 64. For a given alloy, temper, type of test and direction, the offsets from the modulus line in the individual stress-strain tests indicated no significant differences with thickness except for those of 6061-T6510. For 6061-T651X, curves for two thickness ranges were prepared as shown in Figs. 37 through 42. For the minimum stress-strain curves, the tensile and compressive yield stresses used are those shown for the appropriate thickness ranges in Tables XLVI to LIII. For the typical longitudinal tensile stress-strain curves, the values are those indicated in Alcoa's production in recent years and it is assumed that the value for the industry would be about the same. The typical long-transverse ultimate tensile stress and the other yield stresses were based on the derived average ratios obtained in the statistical analyses. All curves were derived and presented in accordance with the procedures outlined in MIL-HDBK-5 Guidelines for Presentation of Data (11).

A.2. Fracture Toughness

The results of the individual fracture-toughness tests are shown in Table LXIV. In each case, an indication is given in the right-hand column as to whether or not the calculated values of K_Q are considered to be meaningful values of K_{Ic} based upon the criteria listed in Section 3 on Procedure; in a very few cases, values which did not meet all of the criteria are classified as meaningful because they fit in well with data for other samples for which the criteria were met. The meaningful values of K_{Ic} from Table LXIV are summarized in Table LXV to arrive at useful average values for the various alloys and tempers. The values of "pop-in" K_{Ic} are not averaged, since these do not comply with the current ASTM definition of K_{Ic} (13) but are included in the table for information.

Representative load-deformation curves are shown in Fig. 72; included are a few curves from tests in which the deviation from linearity prior to the secant offset indicated that the calculated values of K_Q were not meaningful values of K_{Ic} (labeled "not valid"). Representative fracture surfaces are shown in Figs. 73 and 74; the former shows examples of specimens for which the fatigue-crack fronts were judged sufficiently straight (within 20% of thickness) and the latter shows specimens for which the excessive fatigue-crack-front curvature resulted in meaningless values of K_Q.

The average values of 5 per cent secant K_{Ic} from Table LXV are summarized below; only the values for 2024-T851X, 7075-T6510, 7075-T73510 and 7178-T6510 are based upon tests of more than two lots.

	5 per cent Secant - Offset K_{Ic}, psi $\sqrt{in.}$	
	Longitudinal	Long-Transverse
2014-T6510	30 100	25 400
-T62	28 600	28 000
2024-T851X	29 000	18 200
7075-T6510	28 000	23 600
-T62	---	23 800
-T73510	34 200	26 300
7079-T6510	30 900	29 200
-T62	35 800	---
7178-T6510	21 900	21 000
-T62	23 300	22 600

None of the many tests of 2024-T351X resulted in values which could be considered wholly valid, principally because of excessive plastic deformation prior to cracking as indicated by the deviation from linearity in the load-deformation curves. However, the data suggest that the longitudinal value of K_{Ic} for this alloy and temper is in the range of 40,000 to 50,000 psi $\sqrt{in.}$; the data for transverse specimens are not useful even for estimates.

There are insufficient data for any of the alloys and tempers to be certain of trends relative to cross-section, size or shape.

A.3. Axial-Stress Fatigue

The results of the axial-stress fatigue tests (R=0.0) of extrusions in the TX51X and "heat-treated-by-user" tempers are shown in Table LXVI and plotted in Figs. 65 through 71. Log-mean fatigue life values for the three preselected stress levels have been calculated in the table and curves have been drawn through these values in the figures. There are definite differences in the fatigue properties in the longitudinal and long-transverse directions, those in the longitudinal direction being higher. While both directions of specimens from sections 0.750-1.500 in. thick were taken from the center of the cross section, the longitudinal and long-transverse specimens from thicker sections were taken from the midway (T/4) and the center (T/2) locations, respectively. It is doubtful, however, that the difference in location is as significant as that in section.

The following general observations have been made concerning the log-mean fatigue lives of the various alloys and tempers:

(a) 2014-T6510 and 2024-T851X - slightly lower than 2024-T351X
(b) 7075-T73510 - slightly lower than 7075-T6510
(c) 7178-T6510 and 7075-T6510 - about the same.

However, the differences in log-mean fatigue lives may not be significant because of the small number of tests made at only three stress levels.

B. Stress-Corrosion Cracking

The results of stress-corrosion tests are listed in Tables LXVII and LXVIII, the former containing test results for the stress-relieved (TX51X) tempers and the latter results for samples in the "heat-treated-by-user" tempers.

No cracking was detected visually or microscopically in specimens from the stress-relieved samples of 2024-T851X, 6061-T6510 and 7075-T73510 alloys, regardless of test direction. Extrusions of 7079-T6510 were tested only in the longitudinal and long-transverse directions and, in these directions, also demonstrated a high resistance to stress-corrosion cracking.

A high resistance to stress-corrosion cracking was also exhibited by longitudinal specimens from the remaining stress-relieved samples, alloys: 2014-T6510, 2024-T351X, 7075-T6510 and 7178-T6510. However, stress-corrosion cracking was encountered with long-transverse and short-transverse specimens from these alloys.

In the "heat-treated-by-user" tempers specimens from the following samples were highly resistant to stress-corrosion cracking: 2024-T62, 6061-T62 and 7075-T73. Failures were encountered with either long-transverse or short-transverse specimens from the less resistant materials: 2014-T62, 2024-T42, 7075-T62 and 7178-T62.

While the test results appear to be typical for the various alloy-temper combinations, it is felt that some clarification of the data is warranted, particularly with regard to specimen orientation.

Experience(18) with extruded sections has shown that the behavior of test specimens from susceptible alloy-temper combinations will vary with specimen orientation as illustrated in Fig. 75. Longitudinal specimens will show a high order of resistance to stress-corrosion cracking; long-transverse

specimens also will show a relatively high resistance, particularly in thin sections. It should be emphasized that the long-transverse terminology, as used in stress-corrosion testing, is based upon the shape of the grain structure and not upon the shape of the extrusion. Thus, in order for an extruded section to develop a long and a short-transverse direction, the width must be at least twice the thickness. As the width/thickness ratio decreases, the resistance to stress-corrosion cracking in the long-transverse direction decreases progressively. When the ratio approximates unity, the specimens are considered simply "transverse", and the resistance to stress-corrosion cracking is only slightly better than that of short-transverse specimens. Conversely, the relative resistance of long-transverse specimens increases as the width/thickness ratio increases above 2/1.

The use of random samples, as was the case in this contract, resulted in a wide range of width/thickness ratios. Thus, in some sections definite long-transverse and short-transverse structures were not developed. The data are nevertheless considered representative of the various alloy-temper combinations if proper allowance is made for the grain structures involved. This is illustrated in Fig. 76 which compares the resistance of the 7075-T6510 specimens with performance bands previously developed by a large number of tests of 7075-T6 alloy extruded sections(18).

SECTION VI

SUMMARY AND CONCLUSIONS

Based on the results of tests of commercially produced extrusions that met the requirements for tensile properties in applicable Federal specifications, the following conclusions seem warranted concerning mechanical properties, including fracture toughness and fatigue, and resistance to stress-corrosion cracking of 2014, 2024, 6061, 7075, 7079 and 7178 extrusions:

1. The most distinct differences between the average ratios among the properties of the TX51X and "heat-treated-by-user" tempers of extrusions are those involving the longitudinal compressive yield stresses and some of the bearing yield stresses. The largest differences are in those of the solution heat-treated tempers of 2024 (T351X vs T42).

2. Minimum-average ratios for computing the derived minimum design mechanical properties of the TX51X extrusions are as shown in Tables XXXVIII to XLV.

3. Generally, most of the ratios for 2024-T851X and 7079-T6510 and all the longitudinal compressive yield stress ratios, except those of 2024-T351X, indicate no correlation with thickness. Most of those for the other alloys decrease with increase in thickness.

4. Ratios of tensile, compressive, shear and bearing stresses at the center location (T/2, W/2) in the cross sections of the extrusions to the corresponding properties at the midway location (T/2, W/4 or T/4, W/4) are generally about the same, regardless of alloy, temper, thickness, property or direction of specimen. Generally, the ratios indicate that these properties at the center location for each alloy and temper average from about the same to 3 per cent lower than the corresponding properties at the midway location.

5. In general, the bearing stresses obtained using edgewise specimens average 3 per cent lower than those obtained using flatwise specimens, except for the bearing ultimate stresses of 7075-T6510 (e/D=1.5) and 7178-T6510 and -T62 (e/D=1.5 and 2.0) which average 6 to 12 per cent lower.

6. Results of the modulus of elasticity tests indicate the following:

   a. In compression, the values average 2 to 3 per cent higher than those in tension.

   b. For the 2000 series alloys, the long-transverse values in tension and compression average 2 per cent lower and about 1 per cent higher, respectively, than the corresponding longitudinal values.

   c. For 6061 alloy, the long-transverse values for the smaller thickness ranges average 3 per cent higher, and those for the larger thickness ranges average 1 per cent lower, than the corresponding longitudinal values.

   d. For the 7000 series alloys, the values in tension are about the same regardless of direction; the long-transverse values in compression average about 2 per cent higher than the longitudinal values.

7. Average values for modulus of elasticity are:

Alloy or Series	Thickness, in.	Modulus, psi	
		Tensile	Compressive
2000	All	10 800 000	11 000 000
6061	≤0.499	9 700 000	9 900 000
	0.500-2.999	9 900 000*	10 100 000*
	≥3.000	10 300 000	10 600 000
7000	All	10 400 000	10 700 000

* Values presently shown in MIL-HDBK-5

8. Computed design mechanical properties for the TX51X tempers are as shown in Tables XLVI through LIII. For alloys 2014-T651X, 2024-T351X and 7079-T651X where Alcoa has a reasonable amount of production data for long-transverse tensile properties, it appears that higher values than those computed in this report are being met.

9. Typical and minimum ("A" or "S" Value) stress-strain and compressive tangent-modulus curves are as shown in Figs. 22 through 64.

10. Rounded average values of plane-strain stress-intensity factor, K_{Ic} (psi$\sqrt{\text{in.}}$), at [illegible] per cent secant offset, suitable for inclusion for information in MIL-HDBK-5, are as follows:

Alloy and Temper	Longitudinal	Long-Transverse
2014-T651X	30 000	25 000
2024-T851X	29 000	18 000
7075-T651X	28 000	24 000
7075-T7351X	34 000	26 000
7178-T651X	22 000	21 000

Valid values were not obtained for 6061-T651X and 2024-T351X.

11. The results of the axial-stress fatigue tests (R=0.0) are plotted in Figs. 65 through 71. For all the alloys tested, the long-transverse fatigue properties are generally lower than the longitudinal fatigue properties.

12. The results of the stress-corrosion tests revealed typical performance for the various combinations of alloy and temper. The data are in good agreement with and tend to corroborate existing data for aluminum alloy extrusions.

SECTION VII

RECOMMENDATIONS

It is recommended that the computed design mechanical properties in Tables XLVI to LIII, and the stress-strain and compressive tangent-modulus curves in Figs. 22 to 64 be considered for use in the next revision of MIL-HDBK-5.

For some alloys such as 2014-T651X, 2024-T351X and 7079-T651X, where Alcoa has a reasonable amount of production data for long-transverse tensile properties, it appears that higher values than those computed in this report are being met. It is suggested that before adopting these tables in MIL-HDBK-5, the producers be requested to review their production data for the long-transverse tensile properties to determine the industries' capability with respect to these properties for all alloys and tempers.

REFERENCES

1. G. W. Stickley and D. J. Brownhill, "Mechanical Properties of Stress-Relieved Stretched Aluminum Alloy Plate," Technical Report AFML-TDR-64-105, May, 1964.

2. Metallic Materials and Elements for Aerospace Vehicle Structures, February 8, 1966, with revisions November 30, 1966 and November 1, 1967.

3. J. G. Kaufman, G. E. Nordmark and B. W. Lifka, "Fracture Toughness, Fatigue and Corrosion Characteristics of 7075-T651, 7075-T7351 and 7079-T651 Aluminum Alloys," Technical Report AFML-TR-65-170, May, 1965.

4. J. G. Kaufman, G. E. Nordmark and B. W. Lifka, "Fracture Toughness, Fatigue and Corrosion Characteristics of 2020-T651, 2024-T851, 2219-T851 and 7001-T75 Aluminum Alloys," Technical Report AFML-TR-66-291, September, 1966.

5. "Methods of Verification of Testing Machines, E4-64," 1967 Book of ASTM Standards, Part 31.

6. "Methods of Tension Testing of Metallic Materials, E8-66," 1967 Book of ASTM Standards, Part 31.

7. "Methods of Compression Testing of Metallic Materials, E9-67," 1967 Book of ASTM Standards, Part 31.

8. R. E. Davies and J. G. Kaufman, "Effects of Test Method and Specimen Orientation on Shear Strengths of Aluminum Alloys," ASTM Proceedings, Vol. 64, 1964, pp. 999-1010.

9. "Method for Pin-Type Bearing Test of Metallic Materials, E238-64T," 1967 Book of ASTM Standards, Part 31.

10. "Method for Determination of Young's Modulus at Room Temperature, E111-61," 1967 Book of ASTM Standards, Part 31.

11. D. P. Moon and W. S. Hyler, "MIL-HDBK-5 Guidelines for Presentation of Data," Technical Report AFML-TR-66-386, February, 1967.

12. W. F. Brown and J. E. Srawley, "Plane-Strain Fracture-Toughness Testing of High Strength Metals," ASTM STP 411, February, 1967.

REFERENCES (CONT)

13. "Draft Recommended Practice for Notch-Bend Fracture-Toughness Testing," ASTM Committee E24, February, 1967.

14. J. E. Srawley, M. H. Jones and W. F. Brown, Jr., "Determination of Plane-Strain Fracture Toughness," Materials Research and Standards, Vol. 7, No. 6, June, 1967, pp. 262-266.

15. B. W. Lifka and D. O. Sprowls, "Stress-Corrosion Testing of 7079-T6 Aluminum Alloy in Various Environments," ASTM STP 425, Stress Corrosion Testing, 1967, pp. 342-362.

16. Appendix II, Stress Corrosion Testing Methods, Report of Committee B-3 on Corrosion of Nonferrous Metals and Alloys, ASTM Proceedings, Vol. 65, 1965, pp. 182-197.

17. G. W. Stickley and A. A. Moore, "Effects of Lubrication and Pin Surface on Bearing Strengths of Aluminum and Magnesium Alloys," Materials Research and Standards, Vol. 2, No. 9, September, 1962, pp. 747-751.

18. D. O. Sprowls and R. H. Brown, "What Every Engineer Should Know About Stress Corrosion of Aluminum," Metal Progress, Vol. 81, No. 4, 1962, pp. 79-85; Vol. 81, No. 5, 1962, pp. 77-83.

TABLE I

SAMPLES OF EXTRUSIONS TESTED

[AF33(615)-3580]

Stress-Relieved Stretched Extrusions

2014

Temper	Section Thickness in.	ARL Sample Number
T6510	0.061	317950
	0.070	318017*
	0.073	317951
	0.246	318130*
	0.250	340154
	0.271	317994
	0.625	317952
	0.625	340291
	0.628	340486*
	0.750	317924
	1.657	318046
	1.755	340487*

2024

Temper	Section Thickness, in.	ARL Sample Number
T3510	0.075	318132*
	0.094	318019
	0.101	317885
	0.106	317904
	0.120	318018*†
	0.151	317886
	0.255	317942
	0.258	318047
	0.375	317943
	0.510	317926
	0.525	318020*
	0.550	317856
	0.642	317945
	0.815	340418*
	0.950	317944
	1.150	318077
	1.200	317946
	1.450	318021*†
	1.705	340213
	2.250	318133*
	2.760	318048
	4.000	340214
	4.500	340388
T8510	0.075	318022*
	0.094	318134*
	0.101	317887
	0.106	317888
	0.120	318023*
	0.151	317889
	0.255	317890
	0.258	318082
	0.375	317891
	0.510	317892
	0.525	318024*
	0.550	317992
	0.642	317894
	0.815	340419*
	0.950	317893
	1.150	318078
	1.200	317895
	1.450	318025*‡
	1.705	340169
	2.520	340470*
	2.760	318079
	4.000	340215
	4.500	340389

6061

Temper	Section Thickness, in.	ARL Sample Number
T6510	0.050	318136*
	0.075	317857
	0.090	318027*
	0.125	317846
	0.126	317847
	0.180	340482
	0.245	340421*
	0.250	317848
	0.254	340422*
	0.310	317905
	0.315	317953
	0.375	317927
	0.375	318083
	0.918	317906
	1.004	340423*
	1.240	317907
	1.490	340489*
	1.960	317898
	2.000	340226
	6.500	317897

7075

Temper	Section Thickness, in.	ARL Sample Number
T6510	0.065	317899
	0.065	318031*
	0.080	317858
	0.133	318029*
	0.153	340390
	0.160	318030*
	0.209	340403
	0.260	318028*
	0.313	317908
	0.325	340437
	0.375	317924
	0.438	317859
	0.463	318032*
	0.955	340155
	1.023	318033*
	1.188	317860
	1.188	326914
	1.500	317955
	2.000	317861
	2.190	318137*
	2.750	340407
	2.812	340494
	3.040	318138*
	3.090	340391
	5.000	340505
T73510	0.080	317862
	0.209	340393
	0.313	317909
	0.325	340438
	0.375	317900
	0.438	317910
	0.955	340292
	1.000	340439
	1.188	326912
	1.500	317956
	2.000	317962
	2.750	340440
	2.812	340495
	3.090	340392
	5.000	340504

7079

Temper	Section Thickness, in.	ARL Sample Number
T6510	0.080	340405
	0.080	340490*
	0.146	340406
	0.161	340252
	0.251	340253
	0.500	340424*
	0.535	340532

7178

Temper	Section Thickness, in.	ARL Sample Number
T6510	0.063	317902
	0.065	340492*
	0.066	340426*
	0.142	318016
	0.154	318035*
	0.162	340425*
	0.162	317903
	0.180	340395
	0.261	340427*
	0.265	317996
	0.390	340506
	0.625	317937
	0.760	340254
	1.188	326919
	1.200	318139*
	1.438	317557
	1.500	340557
	2.180	318140*

Extrusions in the "Heat-Treated-by-User" Temper

Alloy	Temper	Section Thickness, in.	ARL Sample Number
2014	T62	0.185	340240*
		0.300	318084
		0.499	318085
		3.250	340543
2024	T42	0.064	318088*
		0.083	318086
		0.430	340241*
		0.500	340243
		2.562	340245
	T62	0.064	318089*
		0.083	318087
		0.430	340242*
		0.500	340244
		2.562	340246
6061	T62	0.125	340546
		0.246	318090
		1.625	318091
7075	T62	0.063	318094*
		0.126	318092
		0.350	318096
		1.225	318098*
		2.250	318100
		2.812	340547
	T73**	0.063	318095*
		0.126	318093
		0.350	318097
		1.225	318099*
		2.250	318101
		2.812	340548
7079	T62	0.222	340549
7178	T62	0.050	340247
		0.051	318102*
		0.403	340249
		1.500	340559

* Producer B; all others from Producer A
† T3511 temper
‡ T8511 temper

** Temper designation not strictly correct. Suitable number not yet assigned.

TABLE II

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2014-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Sample			Specimen		Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing**							
										Flatwise				[illegible]			
										Ultimate Stress, psi		Yield Stress, psi††		Ultimate Stress, psi		Yield Stress, psi††	
Section Thickness, in.	Cross-Sectional Area, in²	Number	Location*	Direction†						e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0
0.061	0.30	317950	T/2	L	67 100	62 200	[illegible].0	64 600	--	105 600	138 800	88 200	103 [illegible]	--	--	--	--
				LT	74 700	68 600	5.0‡‡	--	--	--	--	--	--	--	--	--	--
0.070	0.24	318017#	T/2	L	64 900	61 900	9.5	62 800	--	104 500	134 900	86 500	103 600	--	--	--	--
0.073	0.16	317951	T/2	L	62 800	59 100	11.5	59 900	--	--	--	--	--	--	--	--	--
0.246	0.45	318130#	T/2	L	64 100	60 400	10.0	61 000	44 300	110 100	136 900	94 300	[illegible]	--	--	--	--
0.250	3.7	340154	T/2	L	64 900	62 000	12.5	63 800	46 400	109 [illegible]	241 300	93 200	113 [illegible]	--	--	--	--
				LT	68 800	63 700	5.0‡‡	69 300	45 700	--	--	--	--	--	--	--	--
0.371	0.40	317994	T/2	L	67 500	63 800	13.5	6[illegible] 400	47 [illegible]	105 [illegible]	139 500	9[illegible] 400	108 [illegible]	--	--	--	--
				LT	71 700	64 600	6.2	--	--	--	--	--	--	--	--	--	--
0.625	0.50	317952	T/2	L	65 900	61 900	14.3	60 300	44 700	--	--	--	--	--	--	--	--
0.625	0.55	340291	T/2	L	77 500	71 900	10.7	68 000	42 200	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]#	T/2,W/4	L	71 400	64 100	11.4	[illegible]	39 [illegible]	[illegible]	137 [illegible]	[illegible]	[illegible]	--	--	--	--
				LT	69 600	62 200	15.6	[illegible]	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	70 800	63 600	10.0	64 400	[illegible]	[illegible]	137 000	[illegible]	[illegible]	--	--	--	--
				LT	69 300	62 100	10.0	64 [illegible]	40 [illegible]	--	--	--	--	--	--	--	--
0.750	1.4	317924	T/2	L	76 700	71 100	11.5	73 100	42 [illegible]	110 [illegible]	142 800	[illegible]	[illegible]	--	--	--	--
				LT	70 300	63 500	7.8	[illegible]	--	--	--	--	--	--	--	--	--
1.657	2.2	318046	D/4	L	72 600	66 100	10.5	67 [illegible]	41 500	10[illegible] 700	135 600	[illegible]	[illegible]	--	--	--	--
			D/2	L	73 200	66 500	10.5	66 200	41 500	104 [illegible]	132 500	[illegible] 700	[illegible] 700	--	--	--	--
				LT	67 400	60 200	7.8	--	--	--	--	--	--	--	--	--	--
1.755	7.2	340487#	T/4,W/4	L	68 500	63 400	11.8	61 600	43 300	103 [illegible]	134 900	90 100	10[illegible]	93 600	129 [illegible]	65 [illegible]	106 200
				LT	67 900	62 100	5.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	68 800	63 400	11.0	63 000	42 400	105 400	132 400	90 600	104 400	100 600	132 [illegible]	87 700	108 700
				LT	67 900	61 700	5.7	65 500	40 600	--	--	--	--	--	--	--	--

* T - Thickness; W - Width, D - Diameter
† L - Longitudinal; LT - Long-Transverse
‡ Offset equals 0.2 per cent
\# Producer B; all others from Producer A
** Specimens and Fixtures cleaned ultrasonically
†† Offset equals 2 per cent of pin diameter
‡‡ Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length

TABLE III

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T351X ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,◆ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,◆ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Flatwise Ultimate Stress, psi e/D=2.0	Flatwise Yield Stress, psi†† e/D=1.5	Flatwise Yield Stress, psi†† e/D=2.0	Edgewise Ultimate Stress, psi e/D=1.5	Edgewise Ultimate Stress, psi e/D=2.0	Edgewise Yield Stress, psi†† e/D=1.5	Edgewise Yield Stress, psi†† e/D=2.0
0.075	0.70	318132#	T/2	L	65 900	53 000	18.0	45 200	--	96 800	119 200	78 300	94 300	--	--	--	--
				LT	70 500	48 100	15.0###	57 800	--	--	--	--	--	--	--	--	--
0.094	0.30	318019#	T/2	L	63 900	52 800	16.5	58 000	--	97 200	121 800	77 900	92 300	--	--	--	--
0.101	0.33	317885	T/2	L	66 100	53 400	16.5	45 300	--	102 300	126 900	76 200	90 000	--	--	--	--
0.106	0.31	317904	T/2	L	64 400	51 700	20.5	48 100	--	102 200	125 300	77 200	81 100	--	--	--	--
0.120	0.27	318018#**	T/2	L	65 400	54 000	17.5	45 000	--	101 500	129 500	79 900	99 600	--	--	--	--
0.151	[illegible]	317888	T/2	L	69 900	54 400	17.0	45 400	--	102 300	123 600	78 300	91 200	--	--	--	--
				LT	67 700	49 900	11.0###	55 200	--	--	--	--	--	--	--	--	--
0.255	2.8	317942	T/2	L	79 400	61 800	16.0	52 200	43 200	99 100	124 000	74 700	85 000	--	--	--	--
				LT	76 100	55 400	19.0†††	59 900	41 800	105 300	132 100	81 000	95 400	--	--	--	--
0.298	4.2	318087	T/2	L	79 800	60 900	15.0	53 100	43 300	106 300	132 300	81 200	97 000	--	--	--	--
				LT	74 900	54 200	20.0†††	58 100	42 200	107 200	134 400	75 900	97 700	--	--	--	--
0.375	0.62	317983	T/2	L	63 700	49 300	21.5	37 400##	41 600	106 200	133 400	79 500	101 400	--	--	--	--
				LT	57 600	38 600	8.0	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317986	T/2,W/2	L	75 700	57 100	15.0	50 000	40 600	100 600	130 600	77 400	94 8[illegible]	--	--	--	--
				LT	64 900	48 300	8.0	52 500	39 800	--	--	--	--	--	--	--	--
0.525	1.9	318080#	T/2,W/4	L	63 000	48 300	23.5	39 200	42 200	--	--	--	--	--	--	--	--
				LT	61 900	48 600	11.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	62 600	48 500	23.0	40 300	41 200	102 000	118 900	74 400	87 900	--	--	--	--
				LT	63 200	43 500	12.0	47 500	42 200	--	--	--	--	--	--	--	--
0.550	1.9	317856	T/2,W/4	L	[illegible]	62 600	17.5	54 500	40 800	105 100	130 700	79 500	97 300	--	--	--	--
				LT	7[illegible] 800	53 20[illegible]	10.4	48 300	39 800	--	--	--	--	--	--	--	--
0.642	5.6	317945	T/2,W/4	L	77 000	60 800	13.6	51 800	40 400	100 900	128 100	76 700	92 300	--	--	--	--
				LT	64 500	47 900	8.5	55 900	39 000	100 600	121 600	76 700	91 600	--	--	--	--
0.815	3.9	340418#	T/2,W/4	L	80 000	61 800	15.0	57 400	41 600	105 400	130 100	75 800	93 000	--	--	--	--
				LT	69 400	51 000	15.1	54 400	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	78 100	59 400	16.0	53 100	41 [illegible]	104 800	128 600	75 600	92 100	--	--	--	--
				LT	71 300	51 400	20.0	54 200	38 [illegible]	--	--	--	--	--	--	--	--
0.950	4.6	317944	T/2,W/4	L	80 900	60 600	15.0	54 400	39 700	102 400	132 200	73 900	90 500	--	--	--	--
				LT	69 500	50 200	15.6	54 000	--	--	--	--	--	--	--	--	--
1.150	5.6	318077	T/2,W/4	L	78 700	61 500	14.5	55 500	39 600	104 000	127 900	78 000	96 100	95 000	12[illegible]	75 600	94 200
				LT	68 800	58 200	10.9	55 300	--	100 000	126 100	78 200	93 900	--	--	--	--
			T/2,W/2	L	76 300	59 200	14.5	51 900	40 100	102 900	129 200	75 400	93 800	--	--	--	--
				LT	69 600	50 700	16.6	54 600	38 400	--	--	--	--	--	--	--	--
1.200	3.9	317996	T/2,W/4	L	80 300	63 500	14.5	58 000	39 900	105 500	134 300	78 400	93 600	101 900	130 900	77 900	91 900
				LT	67 800	49 500	14.1	54 800	--	--	--	--	--	--	--	--	--
1.450	7.3	318081# ◆◆	T/2,W/4	L	69 400	62 300	14.0	58 100	40 000	105 100	132 200	77 400	92 600	101 900	131 100	75 200	90 700
				LT	68 000	49 000	13.5	50 100	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	79 800	60 800	15.5	56 500	39 700	104 200	129 300	76 500	91 200	100 600	127 600	72 600	90 100
				LT	68 800	49 100	14.6	52 600	39 100	--	--	--	--	--	--	--	--
1.705	4.8	340213	T/4,W/4	L	82 900	62 300	15.0	59 400	40 600	110 800	136 400	76 700	95 900	--	--	--	--
				LT	69 800	48 600	14.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	83 100	61 800	15.0	[illegible] 700	39 000	108 600	133 200	76 400	93 000	106 500	131 000	76 000	92 300
				LT	68 900	49 500	12.0	[illegible] 600	38 800	--	--	--	--	--	--	--	--
2.500	6.8	318139#	T/2,W/4	L	81 100	61 500	14.0	59 200	39 300	103 500	128 600	76 800	94 300	100 300	128 000	76 400	87 300
				LT	67 000	46 200	14.1	49 800	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	80 900	61 900	14.5	55 400	38 500	104 [illegible]	[illegible] 700	77 100	95 900	100 900	125 000	74 000	88 800
				LT	67 000	47 000	12.9	50 400	37 800	--	--	--	--	--	--	--	--
				ST	65 800	44 100	12.5	49 200	41 900	--	--	--	--	--	--	--	--
4.000	24.0	340214	T/4,W/4	L	79 [illegible]	62 300	14.0	57 700	38 300	102 300	130 800	75 600	91 800	94 000	125 000	74 600	91 600
				LT	64 400	47 700	8.0	51 400	36 700	97 000	122 300	80 700	95 700	86 900	116 000	71 400	88 600
			T/2,W/2	L	78 400	60 400	14.0	56 400	37 800	92 600	129 300	76 700	93 000	90 100	121 500	72 700	91 100
				LT	62 900	47 800	7.5	50 800	36 700	--	--	--	--	--	--	--	--
				ST	60 100	42 800	5.7	49 800	39 700	--	--	--	--	--	--	--	--
4.760	29.5	316048	T/4,W/4	L	77 100	58 800	13.5	54 900	40 900	94 000	118 100	73 400	88 200	94 600	122 700	72 900	91 200
				LT	58 600	43 500	5.2	47 900	37 300	92 600	116 500	74 800	93 900	95 200	111 400	71 200	88 000
			T/2,W/2	L	76 8[illegible]	58 [illegible]	13.5	55 000	39 100	96 600	123 500	76 600	93 900	90 900	118 600	74 100	90 400
				LT	50 500	47 000	6.0	49 700	37 700	91 600	115 400	72 900	90 700	--	--	--	--
				ST	58 900	42 500	6.0	47 800	39 200	--	--	--	--	--	--	--	--
4.900	30.7	340388	T/4,W/4	L	80 500	59 200	15.0	57 300	39 800	102 200	131 200	71 600	88 100	97 700	127 600	70 600	86 900
				LT	65 500	54 600	12.0	47 400	37 800	96 900	118 200	71 000	86 600	89 800	112 000	67 800	85 000
			T,W/2	L	78 600	57 100	15.5	54 400	39 400	102 600	128 300	72 100	86 400	95 700	119 900	70 300	88 700
				LT	66 400	46 600	10.5	48 600	36 900	97 500	124 200	71 200	82 000	91 900	125 200	65 600	81 400
				ST	61 400	40 600	7.9	47 500	39 700	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

◆ Offset equals 0.2 per cent

\# Producer B; all others from Producer A

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

** Specimens and Fixtures cleaned ultrasonically

†† Offset equals 2 per cent of pin diameter.

\## Average of two tests; all others, single tests.

††† Sub-size sheet-type specimen; 1/4-in. wide; 1-in. gage length.

\### Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

◆◆ Samples were in the T3511 temper. All others T3510

TABLE [illegible]

MECHANICAL PROPERTIES OF [illegible] STRETCHED [illegible] ALUMINUM ALLOY EXTRUSIONS

([illegible])

Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Specimen Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in [illegible], %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi, e/D=1.5	Bearing** Flatwise Ultimate Stress, psi, e/D=2.0	Bearing** Flatwise Yield Stress, psi††, e/D=1.5	Bearing** Flatwise Yield Stress, psi††, e/D=2.0	Bearing** Edgewise Ultimate Stress, psi, e/D=1.5	Bearing** Edgewise Ultimate Stress, psi, e/D=2.0	Bearing** Edgewise Yield Stress, psi††, e/D=1.5	Bearing** Edgewise Yield Stress, psi††, e/D=2.0
[illegible]	[illegible]	[illegible]#	T/2	L	[illegible] 400	[illegible] 400	[illegible]	[illegible]	--	[illegible]	[illegible]	95 900	114 800	--	--	--	--
				LT	[illegible] 500	[illegible] 600	3.0‡‡‡	[illegible]		--	--	--	--	--	--	--	--
0.094	0.30	318134#	T/2	L	[illegible] 500	66 [illegible]	[illegible]	[illegible]	--	10[illegible] 000	13[illegible] 700	100 000	118 000	--	--	--	--
0.101	[illegible]	317882	T/2	L	[illegible] 200	67 800	6.0	[illegible]	--	105 800	141 300	95 700	122 400	--	--	--	--
0.106	0.31	317588	T/2	L	70 [illegible]	66 [illegible]	[illegible]	[illegible]	--	107 600	141 300	95 500	117 600	--	--	--	--
[illegible]	0.27	318023#	T/2	L	71 300	67 700	[illegible]	[illegible]	--	[illegible] 600	14[illegible] 300	[illegible]7 800	110 300	--	--	--	--
0.151	0.82	317889	T/2	L	71 400	67 000	[illegible]	[illegible]	--	[illegible] 400	144 500	101 [illegible]	11[illegible] 800	--	--	--	--
				LT	75 [illegible]	70 300	8.0‡‡‡	69 600		--	--	--	--	--	--	--	--
[illegible]	[illegible].8	317890	T/2	L	[illegible]	[illegible]	[illegible].5	[illegible]	[illegible]	[illegible]	14[illegible]	[illegible]9 400	11[illegible] 600	--	--	--	--
				LT	[illegible]	[illegible] 200	10.0†††	[illegible]	[illegible]	114 000	145 800	99 900	119 400	--	--	--	--
[illegible]	4.[illegible]	31906[illegible]	T/2	L	75 400	68 [illegible]	[illegible].5	[illegible]	[illegible]	[illegible] 300	143 800	101 000	115 300	--	--	--	--
				LT	74 800	70 000	9.5†††	[illegible]	[illegible]	109 [illegible]	141 400	98 [illegible]	108 100	--	--	--	--
[illegible]	0.62	317891	T/2	L	70 100	65 500	7.[illegible]	64 [illegible]	43 [illegible]	107 100	136 600	98 700	[illegible] 800	--	--	--	--
				LT	[illegible]	[illegible]	4.4	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317892	T/2,W/2	L	73 600	66 [illegible]	9.5	70 500	41 [illegible]	108 700	13[illegible] 800	98 000	109 400	--	--	--	--
				LT	71 [illegible]	66 900	4.6	[illegible] 800	41 [illegible]	--	--	--	--	--	--	--	--
[illegible]	1.9	318024#	T/2,W/4	L	72 [illegible]	[illegible] 600	10.0	[illegible]	41 [illegible]	--	--	--	--	--	--	--	--
				LT	71 [illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	71 400	64 100	10.[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible] 800	--	--	--	--
				LT	70 [illegible]	[illegible] 300	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.550	1.9	317922	T/2,W/4	L	74 100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 600	[illegible]	112 [illegible]	--	--	--	--
				LT	[illegible] 000	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.642	5.8	317894	T/2,W/4	L	75 300	69 000	[illegible].9	70 300	41 700	10[illegible] 700	135 800	96 600	112 900	--	--	--	--
				LT	72 400	67 800	5.0	70 300	40 100	106 200	137 200	94 100	112 200	--	--	--	--
0.815	3.9	340419#	T/2,W/4	L	73 [illegible]	66 200	10.0	6[illegible] 100	40 400	106 900	136 900	92 900	108 000	--	--	--	--
				LT	71 600	66 700	6.2	6[illegible] 200	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	73 000	65 400	1[illegible].0	[illegible] 900	40 400	106 200	138 600	93 000	109 300	--	--	--	--
				LT	72 100	67 100	8.0	67 800	39 400	--	--	--	--	--	--	--	--
[illegible]	4.5	317893	T/2,W/4	L	72 500	68 500	[illegible]	[illegible] 400	[illegible]	104 300	134 900	96 600	11[illegible] 200	--	--	--	--
				LT	70 100	65 700	4.1	[illegible]	--	--	--	--	--	--	--	--	--
1.150	[illegible]	318078	T/2,W/4	L	73 [illegible]	66 [illegible]	8.5	68 800	40 400	106 900	136 700	94 [illegible]	111 00[illegible]	97 [illegible]	127 400	89 700	107 500
				LT	71 200	67 200	[illegible]	66 300	--	[illegible] 300	137 100	96 000	111 600	--	--	--	--
			T/2,W/2	L	71 800	64 900	8.0	69 000	41 000	105 300	136 500	94 300	111 400	--	--	--	--
				LT	71 300	67 100	6.4	67 300	[illegible]	--	--	--	--	--	--	--	--
1.230	3.9	317896	T/2,W/4	L	74 600	68 500	8.5	70 700	41 300	[illegible]	[illegible]	93 600	110 100	101 300	131 000	94 300	110 400
				LT	71 400	67 700	4.7	70 700	--	--	--	--	--	--	--	--	--
1.450	7.3	318025##	T/2,W/4	L	74 800	66 000	[illegible]	[illegible]	[illegible] 000	[illegible]	13[illegible] 500	[illegible]	11[illegible] 900	101 [illegible]	130 700	91 700	110 100
				LT	70 300	65 700	[illegible]	[illegible] 300	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	74 [illegible]	69 000	[illegible]	[illegible]	[illegible]	105 400	[illegible]	[illegible]	113 900	[illegible]	131 [illegible]	91 700	111 200
				LT	71 [illegible]	66 [illegible]	5.4	67 100	41 [illegible]	--	--	--	--	--	--	--	--
1.705	4.8	340169	T/4,W/4	L	[illegible] 400	[illegible]	10.0	[illegible]	40 [illegible]	104 000	[illegible] 100	89 [illegible]	[illegible] 000	--	--	--	--
				LT	[illegible]	[illegible]	6.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	71 [illegible]	[illegible]	10.0	65 600	[illegible]	[illegible]	[illegible]	90 [illegible]	10[illegible] 000	104 300	129 400	90 000	105 700
				LT	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--
2.520	8.8	340420#	T/4,W/4	L	[illegible] 900	64 [illegible]	[illegible]	65 600	39 200	104 000	130 200	90 900	105 100	97 700	127 400	88 100	105 000
				LT	[illegible] 900	64 600	6.2	66 700	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	70 [illegible]	63 400	10.0	65 800	[illegible]	[illegible]	12[illegible]	87 600	105 100	94 [illegible]	126 600	87 100	104 300
				LT	[illegible]	63 800	5.7	[illegible] 100	--	--	--	--	--	--	--	--	--
				ST	[illegible]	63 100	5.0	67 200	[illegible]	--	--	--	--	--	--	--	--
2.760	29.6	318079	T/4,W/4	L	70 400	65 200	9.0	64 200	40 800	89 200	121 600	--	10[illegible] 300	89 600	121 900	90 300	105 000
				LT	64 900	60 500	2.4	64 300	39 100	95 100	124 100	[illegible] 500	104 600	97 700	126 900	88 900	106 000
			T/2,W/2	L	70 100	63 200	6.5	63 700	40 600	93 700	122 800	[illegible] 600	105 400	89 [illegible]	118 400	--***	108 100
				LT	66 600	61 800	2.6	63 900	41 100	97 000	127 400	87 800	101 700	--	--	--	--
				ST	64 100	59 600	1.8	64 200	39 200	--	--	--	--	--	--	--	--
4.000	24.0	340225	T/4,W/4	L	69 900	61 800	10.0	62 300	[illegible] 000	96 900	128 100	88 000	104 400	93 200	122 000	87 600	105 200
				LT	67 700	61 500	6.0	62 900	[illegible] 200	105 600	131 400	86 600	104 300	86 300	124 900	84 700	105 700
			T/2,W/2	L	[illegible]	60 800	9.5	61 600	36 [illegible]	[illegible] 200	125 800	[illegible] 900	105 300	57 600	116 900	84 000	102 400
				LT	66 200	60 500	3.6	61 500	36 [illegible]	--	--	--	--	--	--	--	--
				ST	65 600	58 200	2.5	62 800	36 400	--	--	--	--	--	--	--	--
4.500	30.7	340389	T/4,W/4	L	67 500	58 500	10.5	59 900	38 200	94 [illegible]	123 [illegible]	[illegible] 600	100 000	[illegible] 600	119 700	81 700	96 900
				LT	66 200	58 100	5.0	59 700	36 [illegible]	96 900	119 100	[illegible] 900	98 600	89 400	127 100	81 400	97 800
			T/2,W/2	L	66 800	57 300	11.0	57 900	37 500	90 800	123 600	[illegible]	98 000	89 200	114 100	80 300	96 800
				LT	66 100	58 300	5.5	58 400	36 200	96 300	126 900	78 300	95 600	86 200	114 700	77 200	94 400
				ST	63 700	56 300	5.0	60 500	37 400	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

\# Producer B; all others from Producer A

** Specimens and fixtures cleaned ultrasonically.

†† Offset equals [illegible] per cent of pin diameter.

*** Bearing specimens failed before reaching yield stress ([illegible] per cent offset).

††† [illegible]-size sheet-type specimen, [illegible]-in. wide, [illegible]-in. gage length.

‡‡‡ Subsize sheet-type specimen; [illegible]-in. wide, [illegible]-in. gage length.

\#\# Sample was in the T6511 temper; all others [illegible].

TABLE V

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 6061-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.050	0.42	318136#	T/2	L	45 000	42 400	11.0	41 500	--	79 400	107 300	66 900	75 800	--	--	--	--
0.075	0.59	317857	T/2	L	45 900	39 300	13.0	40 100	--	74 200	91 700	59 400	66 800	--	--	--	--
				LT	44 800	37 200	15.0†††	38 800	--	89 100	105 200	67 400	77 700	--	--	--	--
0.090	0.27	318027#	T/2	L	44 700	42 100	13.5	41 300	--	77 600	103 500	66 200	75 600	--	--	--	--
0.125	0.61	317846#	T/2	L	43 200	38 700	11.5	38 700	--	70 900	90 700	58 000	64 300	--	--	--	--
				LT	41 900	36 000	15.0†††	38 600	--	--	--	--	--	--	--	--	
0.126	0.30	317847	T/2	L	43 900	39 700	10.5	39 800	31 400	--	--	--	--	--	--	--	
0.180	1.6	340482	T/2	L	49 200	46 000	12.0	46 500	--	81 600	105 500	70 200	76 000	--	--	--	
				LT	46 900	43 400	20.0†††	45 700	--	--	--	--	--	--	--	--	--
0.245	1.1	340421#	T/2	L	43 300	41 600	17.0	40 700	33 200	77 600	103 900	66 300	76 300	--	--	--	--
				LT	43 500	39 900	14.1	44 500	33 800	--	--	--	--	--	--	--	--
0.250	0.36	317848	T/2	L	43 000	38 600	12.0	38 800	30 800	--	--	--	--	--	--	--	--
0.254	0.97	340422#	T/2	L	44 400	42 400	16.5	43 000	32 500	78 600	102 800	67 200	76 700	--	--	--	--
				LT	47 300	42 900	17.2	46 500	31 800	--	--	--	--	--	--	--	--
0.310	6.3	317905	T/2	L	47 700	43 200	16.5	42 300	31 100	79 500	101 700	66 800	73 200	--	--	--	--
				LT	49 100	43 400	16.5	44 800	30 700	80 700	103 400	67 500	79 500	--	--	--	--
0.315	5.8	317953	T/2	L	45 500	40 200	18.5	40 100	34 400	78 000	100 600	65 700	67 100	--	--	--	--
				LT	44 700	38 000	18.5	40 100	33 600	78 400	103 100	65 300	71 000	--	--	--	--
0.375	8.6	317927	T/2	L	45 900	42 000	18.5	41 600	36 500	80 000	101 400	65 700	70 900	--	--	--	--
				LT	45 300	40 000	17.0	42 000	36 100	80 600	103 700	67 400	75 300	--	--	--	--
0.375	7.7	318083	T/2	L	46 600	42 500	16.0	41 800	35 400	79 800	101 100	68 400	72 600	--	--	--	--
				LT	43 700	39 400	22.5†††	42 000	33 800	81 000	103 400	69 900	75 000	--	--	--	--
0.918	1.3	317906	T/2,W/2	L	45 900	41 800	20.0	41 700	33 000	78 000	101 400	68 500	73 200	--	--	--	--
				LT	45 500	40 800	19.5	43 500	--	--	--	--	--	--	--	--	--
1.004	2.0	340423#	T/2,W/4	L	45 600	42 200	19.5	40 300	31 600	75 200	96 700	62 400	75 000	73 100	96 600	60 600	72 700
			T/2,W/2	L	45 200	41 900	20.0	40 600	31 900	75 300	99 400	61 800	74 900	73 200	95 600	61 100	74 000
				LT	47 000	40 800	10.9	44 300	30 400	--	--	--	--	--	--	--	--
1.240	2.7	317907	T/2,W/4	L	48 100	43 000	18.5	44 800	28 700	--	--	--	--	--	--	--	--
			T/2,W/2	L	48 800	43 500	18.5	44 100	28 400	72 600	94 300	57 900	66 800	71 900	92 100	56 200	66 900
				LT	43 300	37 600	18.0	40 800	--	--	--	--	--	--	--	--	--
1.490	4.5	340489#	T/2,W/4	L	54 500	50 400	14.5	50 800	28 000	76 600	100 000	61 000	74 300	75 300	96 700	60 100	72 600
				LT	48 000	43 000	18.8	46 200	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	53 200	48 900	16.0	49 400	29 500	76 000	98 900	61 800	74 400	74 600	93 500	59 300	72 600
				LT	48 300	43 400	15.0	46 400	28 000	--	--	--	--	--	--	--	--
1.960	4.4	317896	T/2,W/4	L	51 600	46 800	18.5	46 800	29 600	76 000	96 600	60 000	71 000	--	--	--	--
			T/2,W/2	L	52 000	47 200	18.5	47 800	29 100	75 100	96 300	60 000	68 900	74 700	96 300	59 700	70 600
				LT	45 200	39 300	17.0	43 000	--	--	--	--	--	--	--	--	--
3.000	15.0	340226	T/4,W/4	L	52 900	49 900	16.0	50 100	27 800	76 100	98 600	63 200	73 200	74 900	96 000	62 100	73 400
				LT	47 700	43 100	15.0	46 200	27 500	74 500	95 900	61 800	74 700	72 100	94 400	60 300	73 500
			T/2,W/2	L	52 000	48 700	15.5	48 700	27 800	75 600	97 400	62 500	72 400	74 100	94 300	60 400	70 300
				LT	46 900	43 800	14.0	45 500	26 800	--	--	--	--	--	--	--	--
				ST	47 100	40 800	13.0	44 700	28 700	--	--	--	--	--	--	--	--
6.500	33.2	317897	D/4	L	51 500	46 100	13.5	46 000	27 000	72 600	93 800	57 200	71 000	72 600	92 600	57 200	71 000
				LT	44 600	38 000	22.5	40 700	27 000	69 300	89 500	55 400	68 200	68 500	86 600	54 700	67 500
			D/2	L	51 000	45 700	13.5	45 600	26 800	71 500	91 500	56 500	67 500	--	--	--	--
				LT	44 000	37 000	12.5	39 600	26 600	--	--	--	--	--	--	--	--

* T - Thickness; W - Width; D - Diameter
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent.
\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically
†† Offset equals 2 per cent of pin diameter
††† Subsize sheet-type specimen; 1/4-in. wide; 1-in. gage length

[illegible] ALUMINUM ALLOY EXTRUSIONS

Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Strength, psi	Tensile Yield Strength,‡ psi	Elongation, [illegible]	[illegible]	[illegible]	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Flatwise Ultimate Stress, psi e/D=2.0	Flatwise Yield Stress, psi†† e/D=1.5	Flatwise Yield Stress, psi†† e/D=2.0	Edgewise Ultimate Stress, psi e/D=1.5	Edgewise Ultimate Stress, psi e/D=2.0	Edgewise Yield Stress, psi†† e/D=1.5	Edgewise Yield Stress, psi†† e/D=2.0
0.065	0.18	317899	T/2	L	[illegible] 000	[illegible] 400	[illegible]	[illegible]		[illegible]	158 400	106 900	123 100	--	--	--	--
0.065	0.22	318031#	T/2	L	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible] 400	[illegible]	102 400	125 400	--	--	--	--
				LT	83 000	74 400	[illegible]‡‡‡	[illegible]	--	--	--	--	--	--	--	--	--
0.080	0.18	317858	T/2	L	88 000	81 000	12.0	80 000	--	[illegible] 500	153 900	104 600	124 900	--	--	--	--
0.133	0.97	318029#	T/2	L	84 200	[illegible]	[illegible]	[illegible]		124 600	156 200	107 000	123 900	--	--	--	--
				LT	82 600	[illegible]	[illegible]‡‡‡	[illegible]		--	--	--	--	--	--	--	--
0.153	4.0	340390	T/2	L	[illegible] 400	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	112 100	127 200	--	--	--	--
				LT	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	113 300	135 600	--	--	--	--
0.160	0.26	318030#	T/2	L	87 600	[illegible] 400	[illegible]	82 800		[illegible]	[illegible]	108 [illegible]	128 600	--	--	--	--
0.209	1.2	340403	T/2	L	90 700	82 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 500	110 500	134 500	--	--	--	--
				LT	89 300	80 [illegible]	[illegible]‡‡‡	[illegible]	[illegible] 400	121 800	160 900	106 800	124 800	--	--	--	--
0.260	1.2	318028#	T/2	L	85 500	77 [illegible]	11.5	[illegible] 800	45 500	126 100	158 [illegible]	104 800	123 400	--	--	--	--
				LT	84 100	74 400	[illegible]‡‡‡			--	--	--	--	--	--	--	--
0.313	0.51	317908	T/2	L	89 400	82 700	11.0	65 500	[illegible] 400	--	--	--	--	--	--	--	--
0.325	2.4	340437	T/2	L	86 000	77 300	[illegible]	[illegible]	[illegible] 800	132 900	156 200	[illegible] 100	119 400	--	--	--	--
				LT	86 600	76 200	[illegible]	[illegible] 300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 400	--	--	--	--
0.375	2.2	317954	T/2	L	88 000	80 400	[illegible]	[illegible]	[illegible]	[illegible]	150 [illegible]	104 400	128 600	--	--	--	--
				LT	83 500	74 500	[illegible]	[illegible]		--	--	--	--	--	--	--	--
0.438	7.2	317859	T/2	L	87 600	80 300	[illegible]	[illegible]	[illegible]	[illegible] 100	[illegible] 200	113 000	[illegible]	--	--	--	--
				LT	86 100	[illegible] 700	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	134 200	--	--	--	--
0.463	1.9	318032#	T/2	L	83 800	76 500	[illegible]	[illegible]	[illegible]	[illegible]	155 400	99 400	117 000	--	--	--	--
				LT	78 [illegible]	70 500	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.935	7.2	340155	T/2,W/4	L	88 300	[illegible]	[illegible]	[illegible] 400	[illegible] 500	127 600	161 200	108 500	127 200	--	--	--	--
				LT	83 500	76 100	[illegible]	[illegible] 100	46 100	119 400	151 300	107 600	131 600	--	--	--	--
			T/2,W/2	L	86 400	79 600	[illegible]	[illegible]	[illegible] 000	115 900	[illegible] 400	105 600	[illegible] 300	--	--	--	--
				LT	[illegible] 900	75 300	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
1.023	1.8	318033#	T/2,W/4	L	88 400	82 400	[illegible]	[illegible]	[illegible]	[illegible]	155 100	100 000	123 100	--	--	--	--
1.188	27.1	317860	T/2,W/4	L	86 600	[illegible] 800	11.0	[illegible]	[illegible]	[illegible] 900	[illegible] 400	108 600	121 400	108 900	148 100	98 100	117 200
				LT	84 300	76 300	13.0	[illegible] 000	[illegible] 400	129 000	158 500	111 500	128 600	112 900	142 900	99 700	120 200
			T/[illegible],W/[illegible]	L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 400	[illegible] 500	147 100	100 000	[illegible] 700
				LT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 400	97 500	117 200
1.188	27.1	325914	T/2,W/4	L	[illegible] 400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 000	[illegible]	100 000	120 600
				LT	84 000	75 400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 900	112 800	153 200	100 000	124 400
			T/2,W/2	L	86 900	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	160 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	101 200	122 400
				LT	84 000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	124 500	152 500	99 400	117 100
1.500	1.8	317955	D/2	L	93 600	86 700	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	102 300	121 400	--	--	--	--
				LT	[illegible] 600	[illegible] 500	[illegible]	--	--	--	--	--	--	--	--	--	--
2.000	3.1	317861	D/4	L	93 400	86 700	11.0	[illegible] 400	[illegible]	127 300	164 500	108 000	126 400	--	--	--	--
			D/2	L	91 100	84 100	10.0	[illegible] 400	[illegible]	[illegible]	155 [illegible]	102 300	122 900	--	--	--	--
				LT	79 100	66 700	5.5	[illegible] 200	--	--	--	--	--	--	--	--	--
2.190	17.0	318137#	T/4,W/4	L	83 800	76 000	10.0	[illegible]	46 500	140 600	151 400	105 000	125 000	103 200	139 200	99 400	121 700
				LT	75 000	69 300	[illegible]	[illegible] 400	[illegible]	[illegible] 900	[illegible] 200	104 400	124 300	99 400	131 000	96 800	119 000
			T/2,W/2	L	81 700	[illegible] 500	10.0	[illegible] 400	44 [illegible]	[illegible] 400	[illegible] 100	100 300	120 [illegible]	101 700	136 600	98 700	120 000
				LT	77 400	68 800	[illegible]	[illegible] 000	[illegible] 100	120 300	[illegible] 200	103 800	[illegible] 500	101 900	135 300	94 400	125 600
				ST	70 500	[illegible] 500	[illegible]	[illegible] 000	--	--	--	--	--	--	--	--	--
2.750	8.2	340404	T/4,W/4	L	91 000	83 000	11.0	84 600	48 400	[illegible] 400	[illegible] 900	103 100	122 900	123 900	155 100	105 100	122 900
				LT	80 200	[illegible] 700	[illegible]	[illegible] 100	[illegible] 100	--	--	--	--	--	--	--	--
			T/2,W/2	L	89 300	81 100	11.0	[illegible] 400	[illegible] 300	121 800	[illegible] 100	100 300	120 000	120 700	154 200	102 300	118 600
				LT	78 600	68 600	[illegible]	[illegible] 600	[illegible]	--	--	--	--	--	--	--	--
				ST	76 200	57 500	3.0	[illegible] 600	[illegible] 600	--	--	--	--	--	--	--	--
2.812	11.3	340494	T/4,W/4	L	[illegible] 400	[illegible]	[illegible]	[illegible]	[illegible] 400	[illegible]	[illegible] 400	[illegible] 300	[illegible]	[illegible] 400	157 400	102 500	123 200
				LT	[illegible] 300	70 [illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
			T/2,W/2	L	[illegible] 300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 100	116 [illegible]	117 000	[illegible] 600	96 600	115 800
				LT	77 000	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
				ST	74 000	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
3.040	13.8	318138#	T/4,W/4	L	86 700	79 100	10.0	[illegible]	[illegible]	120 100	152 000	104 500	124 300	115 200	146 100	103 400	122 900
				LT	76 000	[illegible] 000	[illegible]	73 [illegible]	--	118 500	140 300	106 400	126 300	113 300	146 100	100 600	125 000
			T/2,W/2	L	84 400	76 700	10.5	[illegible] 500	[illegible] 400	118 300	151 400	101 600	121 400	115 900	145 200	101 600	118 700
				LT	75 400	66 700	8.2	[illegible] 600	[illegible] 700	--	--	--	--	--	--	--	--
				ST	73 400	63 200	6.0	[illegible] 400	[illegible]	--	--	--	--	--	--	--	--
3.090	24.3	340391	T/4,W/4	L	87 600	78 200	11.5	[illegible] 000	[illegible]	[illegible] 100	159 400	[illegible] 400	[illegible] 700	111 600	148 000	98 000	120 000
				LT	81 200	71 500	10.0	[illegible] 400	[illegible] 000	124 600	151 400	[illegible] 600	118 600	[illegible] 700	[illegible] 200	96 400	118 600
			T/2,W/2	L	84 200	74 600	[illegible]	[illegible] 200	[illegible]	117 400	152 800	97 100	116 500	108 600	138 700	94 300	113 700
				LT	77 400	68 000	[illegible]	[illegible] 700	[illegible] 500	118 000	151 200	95 700	113 100	104 700	135 600	91 500	112 500
				ST	75 000	62 600	6.0	[illegible] 600	44 500	--	--	--	--	--	--	--	--
5.000	30.0	340503	T/4,W/4	L	[illegible] 700	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	115 100	145 100	96 000	115 700
				LT	74 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	141 600	95 400	114 300
			T/2,W/2	L	[illegible] 700	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	140 000	95 900	[illegible] 700
				LT	73 100	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
				ST	[illegible] 600	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--

* T - Thickness; W - Width, D - Diameter
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent.
\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically
†† Offset equals 2 per cent of pin diameter.
‡‡‡ Subsize sheet-type specimen; 1/8-in. wide, 1/2-in. gage length.
\#\#\# Subsize sheet-type specimen; 1/4-in. wide; 1-in. gage length.

TABLE VII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T73510 ALUMINUM ALLOY EXTRUSIONS

AF33(615)-3580

Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.080	0.18	317862	T/2	L	79 400	71 100	9.0	71 300	--	120 600	153 800	103 200	120 500	--	--	--	--
0.209	1.2	340393	T/2	L	75 300	64 100	12.0	66 900	42 500	109 400	159 200	89 100	107 300	--	--	--	--
				LT	73 200	62 500	12.0‡‡	66 000	41 000	111 900	148 100	87 500	107 600	--	--	--	--
0.313	0.51	317909	T/2	L	76 100	66 200	11.5	69 400	44 200	--	--	--	--	--	--	--	--
0.325	2.4	340438	T/2	L	73 500	61 300	12.0	61 800	41 200	109 300	141 800	88 300	104 400	--	--	--	--
				LT	74 700	62 700	11.5	65 200	39 400	109 100	141 200	88 600	106 500	--	--	--	--
0.375	2.2	317900	T/2	L	74 900	64 300	11.5	65 800	44 300	113 400	146 300	92 300	109 400	--	--	--	--
				LT	72 600	62 300	11.0	66 600	42 800	--	--	--	--	--	--	--	--
0.438	7.2	317910	T/2	L	77 200	67 500	12.0	69 800	45 100	118 100	152 800	98 900	117 200	--	--	--	--
				LT	76 600	67 600	10.0	71 800	44 100	118 800	152 600	97 600	120 000	--	--	--	--
0.935	7.2	340292	T/2,W/4	L	79 200	70 300	12.5	70 600	44 600	116 300	149 400	96 400	114 300	--	--	--	--
				LT	76 600	67 700	12.5	71 400	43 300	115 100	144 000	97 300	113 600	--	--	--	--
			T/2,W/2	L	77 700	68 700	13.0	68 800	43 800	116 600	149 100	96 400	113 600	--	--	--	--
				LT	76 000	66 900	12.0	69 800	42 900	--	--	--	--	--	--	--	--
1.000	5.7	340439	T/2,W/4	L	76 700	66 900	13.0	66 900	44 200	112 200	146 300	90 900	107 300	105 900	134 500	97 600	103 800
				LT	73 500	63 100	12.0	66 100	42 500	114 300	147 500	91 900	111 100	103 500	136 600	96 000	105 100
			T/2,W/2	L	74 500	64 300	12.5	64 600	43 300	110 200	143 300	88 100	103 900	107 500	139 700	90 100	106 200
				LT	72 700	62 500	11.0	64 600	41 700	--	--	--	--	--	--	--	--
1.18[illegible]	27.1	326912	T/2,W/4	L	74 000	6[illegible] 600	12.8	64 700	43 900	112 100	144 300	91 200	108 700	100 600	13[illegible] 700	[illegible]	[illegible]
				LT	72 600	6[illegible] 200	11.2	65 600	42 900	111 500	146 000	90 800	110 200	101 300	13[illegible] 400	[illegible]	[illegible]
			T/2,W/2	L	74 500	64 600	12.0	63 900	43 300	112 100	143 700	91 600	108 600	98 700	13[illegible] [illegible]	[illegible]	107 [illegible]
				LT	73 700	63 500	12.5	66 500	42 300	112 800	145 500	89 400	111 700	100 600	135 000	86 500	106 400
1.500	1.8	317956	D/2	L	79 700	72 100	11.0	73 800	44 700	111 100	145 700	93 800	111 500	--	--	--	--
				LT	71 800	61 600	6.2	--	--	--	--	--	--	--	--	--	--
2.000	3.1	317948	D/4	L	78 800	71 100	11.5	72 800	44 200	111 400	146 000	90 700	109 400	--	--	--	--
			D/2	L	77 800	70 300	12.0	71 400	43 600	112 200	143 800	92 300	109 400	--	--	--	--
				LT	70 200	60 500	6.2	65 200	--	--	--	--	--	--	--	--	--
2.750	8.2	340440	T/4,W/4	L	77 000	68 500	12.5	69 500	43 900	110 200	144 000	89 300	107 800	109 700	141 200	88 800	105 900
				LT	71 900	61 800	9.4	65 100	41 600	--	--	--	--	--	--	--	--
			T/2,W/2	L	75 000	66 300	12.5	66 900	43 000	107 600	138 900	86 200	103 700	109 600	139 800	88 300	104 400
				LT	69 300	59 000	9.0	62 900	40 900	--	--	--	--	--	--	--	--
			T/4,W/4	ST	69 400	58 900	8.0	62 800	41 200	--	--	--	--	--	--	--	--
2.612	11.3	340495	T/4,W/4	L	74 400	65 700	11.5	67 300	42 200	111 100	142 600	88 800	103 400	108 200	136 100	87 400	103 700
				LT	69 000	59 500	10.0	63 700	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	73 200	64 700	11.5	65 900	40 800	107 400	138 400	85 900	102 300	103 400	136 400	85 600	102 300
				LT	67 400	58 300	7.1	61 500	39 900	--	--	--	--	--	--	--	--
				ST	66 100	56 900	5.0	61 100	42 000	--	--	--	--	--	--	--	--
3.090	24.3	340392	T/4,W/4	L	76 100	66 600	11.5	66 800	41 700	112 600	144 300	92 900	109 400	107 400	137 200	68 800	112 200
				LT	72 200	63 400	9.0	66 200	41 600	112 600	142 900	90 700	110 100	102 800	131 600	87 400	100 100
			T/2,W/2	L	75 400	66 300	11.0	66 000	41 400	109 100	139 800	92 100	112 200	103 100	132 800	89 500	108 300
				LT	70 500	61 700	9.5	64 800	39 900	106 900	140 300	85 000	101 900	102 500	131 100	82 000	99 800
				ST	69 600	58 900	6.0	64 400	41 700	--	--	--	--	--	--	--	--
5.000	30.0	340504	T/4,W/4	L	72 700	63 400	12.0	64 400	41 900	104 200	137 100	85 800	101 400	103 400	134 700	84 500	102 400
				LT	67 100	56 700	8.0	60 600	40 100	105 700	141 700	87 100	109 300	99 400	128 300	83 600	101 900
			T/2,W/2	L	70 200	60 200	11.5	59 900	40 800	102 000	132 200	82 500	97 100	100 900	131 600	82 100	98 500
				LT	65 300	53 600	9.5	57 300	41 500	--	--	--	--	--	--	--	--
				ST	65 200	52 900	8.0	56 700	39 800	--	--	--	--	--	--	--	--

* T - Thickness; W - Width; D - Diameter
† L - Longitudinal; LT - Long-Transverse
‡ Offset equals 0.2 per cent.
** Specimens and Fixtures cleaned ultrasonically
†† Offset equals 2 per cent of pin diameter.
‡‡ Subsize sheet-type specimen; 1/4-in. wide; 1-in. gage length

TABLE VIII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7079-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness in.	Sample Cross-Sectional Area, in.^{2}	Sample Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.080	0.15	340405	T/2	L	84 200	77 600	10.5	75 600	--	123 100	156 200	104 400	119 400	--	--	--	--
0.0[illegible]	0.45	340490#	T/2	L	78 600	73 000	11.0	74 500	--	[illegible]	155 400	102 300	115 [illegible]	--	--	--	--
0.146	1.1	340406	T/2	L	85 200	77 700	10.0	76 600	--	124 000	156 100	109 300	124 100	--	--	--	--
				LT	84 800	75 700	12.0###	82 100	--	128 000	157 400	106 800	125 900	--	--	--	--
0.161	0.72	340252	T/2	L	86 400	79 300	10.5	78 400	--	124 400	156 500	106 300	123 300	--	--	--	--
				LT	84 100	75 100	16.0‡‡‡	84 100	--	--	--	--	--	--	--	--	--
0.251	0.82	340253	T/2	L	85 700	78 900	12.0	79 700	48 400	125 100	156 100	105 200	118 600	--	--	--	--
				LT	81 000	72 600	14.1	79 600	47 500	--	--	--	--	--	--	--	--
0.500	4.2	340424#	T/2,W/4	L	83 200	75 600	13.0	75 700	45 000	118 800	150 600	97 300	113 700	--	--	--	--
				LT	79 500	71 000	15.0	78 300	44 000	118 900	151 100	97 500	118 600	--	--	--	--
			T/2,W/2	L	82 400	74 500	14.0	75 100	45 200	118 800	148 900	97 300	111 600	--	--	--	--
				LT	80 700	71 300	19.0###	77 400	44 500	--	--	--	--	--	--	--	--
0.535	1.8	340532	T/2,W/4	L	88 400	62 500	12.0	82 900	48 300	126 900	162 800	103 200	117 300	--	--	--	--
				LT	75 600	68 900	12.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	83 900	78 400	12.0	80 200	46 200	122 900	159 700	99 300	117 500	--	--	--	--
				LT	77 400	70 800	10.0	76 500	46 000	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse
‡ Offset equals 0.2 per cent
\# Producer B; all others from Producer A
** Specimens and Fixtures cleaned ultrasonically
†† Offset equals 2 per cent of pin diameter
‡‡‡ Subsize sheet-type specimen; 1/8-in. wide; 1/2-in. gage length
Subsize sheet-type specimen; 1/4-in. wide; 1-in. gage length

TABLE IX

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7178-T6510 ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Section Thickness in.	Sample Cross-Sectional Area, in.²	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.063	0.37	317902	T/2	L	95 400	89 900	9.5	90 400	--	133 500	168 900	117 400	138 900	--	--	--	--
				LT	94 200	87 500	10.0‡‡‡	93 800	--	--	--	--	--	--	--	--	--
0.065	0.33	340491	T/2	L	89 900	83 100	9.0	84 800	--	129 900	169 100	106 [illegible]	126 900	--	--	--	--
				LT	86 100	79 500	5.0†††	85 800	--	--	--	--	--	--	--	--	--
0.066	0.35	340426#	T/2	L	90 700	82 000	9.0	82 400	--	135 800	174 100	111 500	136 400	--	--	--	--
				LT	90 800	80 900	12.0‡‡‡	88 700	--	--	--	--	--	--	--	--	--
0.142	1.0	318016	T/2	L	93 300	86 900	9.5	84 300	--	131 600	166 700	114 900	137 300	--	--	--	--
				LT	92 000	83 400	14.0‡‡‡	92 300	--	--	--	--	--	--	--	--	--
0.154	0.42	318035#	T/2	L	92 200	85 800	9.5	90 800	--	13[illegible] 300	172 600	120 300	138 500	--	--	--	--
0.162	0.49	317903	T/2	L	91 900	85 400	10.5	84 000	--	[illegible]	164 400	114 300	129 600	--	--	--	--
0.152	1.1	340425#	T/2	L	91 500	83 200	9.5	78 800	--	130 [illegible]	161 400	110 200	126 700	--	--	--	--
				LT	86 500	78 300	9.0‡‡‡	84 700	--	--	--	--	--	--	--	--	--
0.150	4.6	340395	T/2	L	92 700	85 800	10.0	85 000	--	131 800	165 500	118 300	139 000	--	--	--	--
				LT	94 400	87 500	8.0	94 700	--	140 700	164 600	122 000	145 500	--	--	--	--
0.261	0.60	340427#	T/2	L	92 700	86 200	10.0	88 700	52 200	135 100	170 900	110 600	129 400	--	--	--	--
				LT	86 700	79 400	12.0	--	--	--	--	--	--	--	--	--	--
0.265	0.88	317966	T/2	L	95 400	89 400	10.0	89 200	51 500	132 600	166 600	112 700	125 600	--	--	--	--
0.270	3.6	340566	T/2	L	91 700	83 900	10.5	83 200	50 500	129 000	162 500	109 600	125 700	--	--	--	--
				LT	89 700	79 700	14.5†††	86 100	47 000	131 800	161 100	113 600	139 200	--	--	--	--
0.625	6.9	317977	T/2,W/4	L	93 600	86 900	10.7	85 500	51 600	133 400	164 800	114 300	134 300	--	--	--	--
				LT	91 100	81 500	10.2	88 200	50 000	132 400	158 200	113 600	134 200	--	--	--	--
			T/2,W/2	L	92 600	85 900	10.7	83 900	51 800	131 000	166 500	113 600	129 300	--	--	--	--
				LT	89 400	80 700	11.4	87 500	50 200	--	--	--	--	--	--	--	--
0.780	1.7	340254	T/2,W/2	L	99 200	93 400	10.0	94 300	50 600	137 200	171 500	110 800	133 100	--	--	--	--
				LT	88 900	79 900	8.0	--	--	--	--	--	--	--	--	--	--
1.186	27.1	326919	T/2,W/4	L	91 800	86 400	10.5	84 200	52 000	137 600	162 900	117 100	132 100	115 700	153 500	[illegible]	[illegible]
				LT	89 500	82 000	10.2	89 000	51 500	136 200	162 500	117 000	138 500	119 000	153 300	[illegible]	[illegible]
			T/2,W/2	L	91 900	86 800	12.0	85 000	52 000	135 700	169 000	114 300	132 100	118 500	153 100	109 300	132 100
				LT	89 200	82 200	12.5	88 200	50 500	131 800	162 000	114 500	139 000	112 700	155 300	108 200	129 400
1.200	3.9	318139#	T/2,W/4	L	94 900	89 300	9.5	91 000	50 200	132 500	166 700	113 900	137 700	[illegible]	151 500	116 000	136 300
				LT	86 300	79 600	6.5	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	93 200	87 500	9.5	88 900	50 700	132 200	166 300	111 400	139 [illegible]	122 400	159 200	114 700	136 900
				LT	85 400	78 900	7.5	86 400	49 500	--	--	--	--	--	--	--	--
1.438	6.4	317957	T/2	L	101 300	95 500	8.5	97 200	52 500	133 100	167 600	115 700	137 100	--	--	--	--
				LT	85 400	76 900	4.7	--	--	--	--	--	--	--	--	--	--
1.500	17.3	340557	T/2,W/4	L	93 300	85 700	10.0	83 400	50 000	130 300	163 400	109 300	123 200	116 400	148 600	103 600	127 900
				LT	88 700	79 900	7.9	85 800	48 300	130 300	154 200	111 400	130 300	114 300	150 900	107 100	124 600
			T/2,W/2	L	91 900	84 400	10.0	80 500	49 500	129 300	161 400	108 700	129 300	115 300	150 000	110 100	129 400
				LT	86 600	77 200	8.0	83 000	47 000	126 900	157 500	106 800	122 500	104 900	147 200	[illegible] 000	121 100
2.180	15.5	318140#	T/4,W/4	L	91 100	83 300	8.0	83 700	49 100	124 400	161 700	113 600	134 300	112 700	145 000	110 300	130 000
				LT	82 600	75 000	5.0	82 600	46 600	128 400	155 400	114 300	134 900	108 500	148 100	109 600	131 200
			T/2,W/2	L	88 600	79 500	9.0	80 100	48 500	122 600	159 100	110 700	129 300	108 800	144 500	105 600	130 700
				LT	82 400	73 500	6.5	73 200	46 000	123 800	157 600	108 100	128 500	102 600	140 600	101 200	125 000
				ST	76 600	[illegible]	2.6	77 300	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent.
\# Producer B; all others from Producer A

** Specimens and fixtures cleaned ultrasonically [illegible]
†† Offset equals 2 per cent of pin diameter
‡‡‡ Subsize sheet-type specimen, 1/2 in. wide [illegible]
††† Subsize sheet-type specimen, 1/4 in. [illegible]

TABLE X

MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER
[AF33(615)-3580]

Alloy and Temper	Sample Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress,** psi e/D=1.5	Bearing** Flatwise Yield Stress,** psi e/D=2.0	Bearing** [illegible] Ultimate Stress, psi e/D=1.5	Bearing** [illegible] Ultimate Stress, psi e/D=2.0	Bearing** [illegible] Yield Stress,** psi e/D=1.5	Bearing** [illegible] Yield Stress,** psi e/D=2.0
2014-T62	0.185	1.0	340240§	T/2	L	66 500	62 600	11.5	67 900	--	109 200	141 200	94 400	[illegible]	--	--	--	--
					LT	71 700	63 900	11.0**	68 700	--	--	--	--	--	--	--	--	--
	0.300	6.3	318094	T/2	L	74 200	67 200	9.5	70 100	43 100	112 200	144 600	[illegible]	[illegible]	--	--	--	--
					LT	74 700	63 400	12.5	72 [illegible]	41 400	112 500	143 500	[illegible]	[illegible]	--	--	--	--
	0.499	1.4	318095	T/2	L	71 700	65 100	13.0	69 100	41 300	110 200	141 [illegible]	[illegible]	[illegible]	--	--	--	--
					LT	70 300	63 [illegible]	10.2	67 300	--	--	--	--	--	--	--	--	--
	3.250	8.3	340543	D/4	L	74 600	67 200	11.0	69 800	4[illegible] 200	107 400	136 800	[illegible] 800	107 400	105 700	13[illegible] 400	[illegible]	[illegible]
					LT	68 500	61 700	6.2	64 100	--	--	--	--	--	--	--	--	--
				D/2	L	73 400	65 700	11.0	68 200	41 [illegible]	106 200	134 300	88 800	10[illegible]	--	--	--	--
					LT	67 300	60 300	8.0	63 500	40 000	--	--	--	--	--	--	--	--
2024-T42	0.064	0.2[illegible]	318088§	T/2	L	65 000	44 500	20.5	44 600	--	103 [illegible]	123 100	[illegible]	[illegible]	--	--	--	--
					LT	69 100	43 500	18.0**	47 500	--	--	--	--	--	--	--	--	--
	0.083	0.2[illegible]	318086	T/2	L	66 100	41 600	21.0	44 000	--	98 400	[illegible]	[illegible]	[illegible]	--	--	--	--
					LT	67 100	42 400	15.0**	43 900	--	--	--	--	--	--	--	--	--
	0.430	2.1	340241§	T/2	L	[illegible] 400	48 200	18.5	[illegible]	[illegible]	100 800	12[illegible]	[illegible]	[illegible]	--	--	--	--
					LT	72 100	47 700	21.0	50 600	[illegible]	--	--	--	--	--	--	--	--
	0.500	0.64	340243	T/2	L	79 800	54 800	17.5	[illegible]	[illegible]	107 500	129 800	[illegible] 500	90 [illegible]	--	--	--	--
					LT	71 600	47 800	18.0	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340245	T/4,W/4	L	82 100	58 500	15.5	58 700	40 [illegible]	106 800	134 500	[illegible] 000	[illegible]	134 [illegible]	[illegible]	[illegible]	[illegible] 500
					LT	69 700	47 400	14.1	50 000	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	80 900	56 500	15.5	57 100	39 [illegible]	104 300	130 500	[illegible]	[illegible]	98 [illegible]	[illegible]	[illegible]	[illegible]
					LT	61 300	45 300	6.5	47 600	[illegible]	--	--	--	--	--	--	--	--
					ST	64 000	44 000	8.5	47 300	41 [illegible]	--	--	--	--	--	--	--	--
2024-T62	0.064	0.27	318089§	T/2	L	65 700	54 900	[illegible]	54 100	--	107 500	132 200	85 [illegible]	102 500	--	--	--	--
					LT	69 500	55 200	11.0**	57 900	--	--	--	--	--	--	--	--	--
	0.083	0.27	318087	T/2	L	66 900	55 900	7.0	60 000	--	109 300	135 400	[illegible] 100	111 [illegible]	--	--	--	--
					LT	68 800	54 600	9.0**	57 500	--	--	--	--	--	--	--	--	--
	0.430	2.1	340242§	T/2	L	68 300	57 700	12.0	62 200	38 700	100 900	130 600	81 700	99 300	--	--	--	--
					LT	67 700	57 700	12.0	61 000	3[illegible] 600	--	--	--	--	--	--	--	--
	0.500	0.64	340244	T/2	L	71 800	59 300	11.0	61 400	40 000	102 800	134 100	82 300	100 000	--	--	--	--
					LT	68 100	58 000	9.0	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340246	T/4,W/4	L	[illegible]	58 100	10.5	59 500	40 000	101 400	131 900	82 900	101 700	96 800	127 400	81 500	100 600
					LT	66 100	55 300	7.0	58 400	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	67 800	5[illegible] 800	10.5	56 200	38 300	95 800	125 000	80 500	99 400	96 900	120 200	82 200	95 500
					LT	62 [illegible]	[illegible]	6.5	53 700	36 500	--	--	--	--	--	--	--	--
					ST	63 000	52 700	6.0	55 600	38 400	--	--	--	--	--	--	--	--
6061-T62	0.125	2.2	340546	T/2	L	47 200	43 900	12.5	44 900	--	78 200	100 600	69 200	74 600	--	--	--	--
					LT	44 300	40 100	19.0***	43 000	--	76 800	104 100	65 000	74 700	--	--	--	--
	0.246	4.6	318090	T/2	L	48 000	43 800	15.5	45 100	35 300	80 200	104 000	69 400	80 500	--	--	--	--
					LT	46 100	41 500	18.5	44 000	35 200	82 400	105 200	73 800	85 400	--	--	--	--
	1.625	3.9	318091	T/4,W/4	L	46 100	41 200	18.0	42 500	32 200	75 900	98 000	67 500	77 700	--	--	--	--
					LT	45 000	39 400	14.0	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	45 900	41 500	19.0	42 700	32 700	76 300	96 300	69 200	76 700	74 600	95 500	67 800	75 300
					LT	45 600	40 300	15.0	43 200	31 200	--	--	--	--	--	--	--	--

(continued)

TABLE X (Concluded)

MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER
[AF33(616)-3982]

Alloy and Temper	Section Thickness, in.	Cross-Sectional Area, sq in.	Number	Specimen Location*	Specimen Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Edgewise Ultimate Stress, psi e/D=2.0	Edgewise Yield Stress,†† psi e/D=1.5	Edgewise Yield Stress,†† psi e/D=2.0	Flatwise Ultimate Stress, psi e/D=1.5	Flatwise Ultimate Stress, psi e/D=2.0	Flatwise Yield Stress,†† psi e/D=1.5	Flatwise Yield Stress,†† psi e/D=2.0
[illegible]-T62	0.063	0.34	318094§	T/2	L	80 700	70 600	11.0	74 900	--	125 900	152 700	96 900	115 600	--	--	--	--
					LT	79 200	70 000	13.0‡‡	75 700	--	--	--	--	--	--	--	--	--
	0.125	0.17	318092	T/2	L	91 300	83 100	10.0	88 400	--	--	--	--	--	--	--	--	--
	0.340	1.7	318096	T/2	L	91 000	81 500	[illegible]	85 900	48 700	124 000	158 500	106 [illegible]	125 700	--	--	--	--
					LT	84 600	75 000	9.4	[illegible] 900	47 600	--	--	--	--	--	--	--	--
	[illegible]	[illegible]	318096§	T/2,W/4	L	[illegible] 100	[illegible] 000	10.5	[illegible]	[illegible]	124 900	153 [illegible]	110 200	124 000	109 [illegible]	144 [illegible]	[illegible]	[illegible]
					LT	81 000	72 400	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
				T/2,W/2	L	84 500	75 100	11.5	[illegible]	47 [illegible]	124 000	155 500	107 [illegible]	[illegible] 000	[illegible]	[illegible]	[illegible]	[illegible]
					LT	80 000	71 400	8.0	[illegible]	[illegible]	[illegible]	151 100	107 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.250	4.1	318207	T/4	L	91 700	[illegible] 100	10.5	[illegible] 000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				T/2	L	[illegible]	81 900	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--
					LT	[illegible] 700	[illegible] 100	[illegible]	[illegible] 400	[illegible]	--	--	--	--	--	--	--	--
	[illegible]	[illegible]	[illegible]	T/4,W/4	L	[illegible]	[illegible]	10.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					LT	80 400	71 800	8.0	[illegible] 300	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	87 400	[illegible] 800	11.0	81 000	47 000	121 600	148 900	100 900	121 600	[illegible]	148 [illegible]	[illegible]	[illegible]
					LT	[illegible] 700	[illegible] 800	5.0	74 600	[illegible] 100	--	--	--	--	--	--	--	--
					ST	[illegible] 700	[illegible] 600	5.0	71 100	[illegible] 500	--	--	--	--	--	--	--	--
[illegible]#	[illegible]	0.34	[illegible]	T/2	L	[illegible] 300	[illegible]	[illegible]	[illegible] 100	--	[illegible]	[illegible]	[illegible]	[illegible] 300	--	--	--	--
					LT	[illegible] 500	[illegible]	11.0‡‡	[illegible]	--	--	--	--	--	--	--	--	--
	[illegible]	[illegible]	[illegible]	T/2	L	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--
	[illegible]	[illegible]	[illegible]	[illegible]	L	[illegible]	[illegible] 000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 100	--	--	--	--
					LT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
	[illegible]	[illegible]	[illegible]	T/2,W/4	L	[illegible] 400	[illegible]	10.[illegible]	[illegible]	[illegible]	[illegible] 100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	70 [illegible]	[illegible]	[illegible]	[illegible]	[illegible] 900	[illegible] 000	[illegible] 600	[illegible]	[illegible]	[illegible]
					LT	[illegible] 100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 200	[illegible] 100	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	4.1	318102	T/4	L	[illegible] 500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				D/[illegible]	L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 400	[illegible]	[illegible]	--	--	--	--
					LT	[illegible] 600	[illegible] 500	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
	[illegible]	11.3	[illegible]	T/4,W/4	L	[illegible] 300	[illegible]	[illegible]	[illegible]	41 [illegible]	[illegible] 900	[illegible]	89 100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible] 600	[illegible] 200	10.0	60 700	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	[illegible] 100	[illegible]	[illegible]	61 [illegible]	40 [illegible]	[illegible] 100	[illegible] 100	83 600	101 600	[illegible] 100	[illegible]	[illegible]	101 400
					LT	[illegible] 500	[illegible] 100	8.[illegible]	[illegible]	[illegible] 400	--	--	--	--	--	--	--	--
					ST	[illegible] 600	54 200	[illegible]	[illegible] 000	[illegible]	--	--	--	--	--	--	--	--
[illegible]	0.220	0.66	[illegible]	T/2	L	[illegible] 200	[illegible] 600	11.5	80 100	[illegible] 500	121 300	159 [illegible]	100 000	[illegible] 700	--	--	--	--
					LT	[illegible]	73 [illegible]	18.0	[illegible]	--	--	--	--	--	--	--	--	--
[illegible]-T62	0.050	0.15	[illegible]	T/2	L	[illegible] 700	[illegible] 600	11.5	91 [illegible]	--	[illegible] 400	[illegible] 100	[illegible] 300	[illegible] 900	--	--	--	--
					LT	[illegible] 800	[illegible] 100	10.0‡‡	--	--	--	--	--	--	--	--	--	--
	[illegible]	0.20	318102§	T/2	L	[illegible] 400	[illegible] 700	[illegible]	[illegible]	--	[illegible] 400	[illegible]	[illegible] 900	147 [illegible]	--	--	--	--
	[illegible]	3.0	[illegible]	T/2	L	[illegible] 200	[illegible]	10.5	[illegible] 800	51 [illegible]	[illegible] 100	[illegible]	116 500	[illegible] 400	--	--	--	--
					LT	[illegible]	[illegible] 100	14.0***	[illegible]	[illegible]	141 500	164 800	110 [illegible]	[illegible]	--	--	--	--
	1.500	11.[illegible]	[illegible]	T/2,W/4	L	[illegible] 400	[illegible] 600	10.0	[illegible] 600	[illegible]	[illegible] 000	165 100	[illegible]	[illegible] 100	120 200	150 600	[illegible]	[illegible] 100
					LT	89 900	82 500	6.8	82 000	50 100	[illegible]	161 100	118 600	140 [illegible]	116 [illegible]	154 000	[illegible] 400	130 [illegible]
				T/2,W/2	L	[illegible] 900	84 300	10.0	87 400	51 300	130 500	163 800	113 000	[illegible] 600	116 000	150 600	110 200	132 600
					LT	[illegible] 600	77 900	10.0	[illegible] 700	49 300	129 400	165 200	109 700	[illegible]	116 000	153 800	[illegible] 200	134 400

* T - Thickness; W - Width, D - Diameter.

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse.

‡ Offset equals 0.2 per cent.

§ Producer B; all others from Producer A.

\# Temper designation not strictly correct. Suitable number not yet assigned.

** Specimens and fixtures cleaned ultrasonically

†† Offset equals 2 per cent of pin diameter.

‡‡ Subsize sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

*** Subsize sheet-type specimen; 1/4-in. wide; 1-in. gage length.

TABLE [illegible]

SPECIFIED MINIMUM VALUES FOR ALUMINUM ALLOY EXTRUSIONS

[illegible]

Alloy and Temper	Thickness, in.	Area, sq in.	Tensile Ultimate Strength, psi	Tensile Yield Strength,† psi	Elongation 2 in. or 4D,** %	Federal Specification
2014-T62	≤0.749	All	[illegible]	[illegible]	7	
	≥0.750	≤25	[illegible]	[illegible]	7	
-T6510	≤0.499	All	[illegible]	[illegible]	7	QQ-A-200/2c
	0.500-0.749	All	64 000	58 000	7	
	≥0.750	≤25	68 000	60 000	7	
2024-T3510, -T3511	≤0.249	All	[illegible]	[illegible]	12	
	0.250-0.749	All	[illegible]	44 000	12	
	0.750-1.499	All	[illegible]	[illegible]	10	
	≥1.500	≤25	[illegible]	[illegible]	10	
	≥1.500	>25, ≤32	[illegible]	[illegible]	8	QQ-A-200/3c
-T42	≤0.749	All	[illegible]	[illegible]	12	
	≥1.500	≤25	[illegible]	[illegible]	10	
-T8510, -T8511	0.050-0.249	All	[illegible]	[illegible]	4	
	0.250-1.499	All	[illegible]	[illegible]	5	
	≥1.500	≤32	66 000	58 000	5	
-T62	≤0.749	-	--	--	-	None
	≥1.500	-	--	--	-	
6061-T62‡, -T6510	≤0.249	All	[illegible]	[illegible]	8	QQ-A-200/8c
	≥0.250	All	[illegible]	[illegible]	10	
7075-T62‡, -T6510	≤0.249	All	78 000	70 000	7	
	0.250-0.499	All	81 000	73 000	7	
	0.500-2.999	All	81 000	72 000	7	QQ-A-200/11c
	3.000-4.499	≤20	81 000	71 000	7	
	3.000-4.499	>20, ≤32	78 000	70 000	6	
	4.500-5.000	≤32	78 000	68 000	6	
-T73,* -T73510§	≤0.249	≤32	[illegible]	[illegible]	7	
	0.250-0.499	≤32	[illegible]	[illegible]	7	
	0.500-1.499	≤32	70 000	[illegible]	7	QQ-A-200/11c
	1.500-2.999	-	--	--	-	
	3.000-4.499	-	--	--	-	
	4.500-5.000	-	--	--	-	
7079-T62‡, -T6510	≤0.249	≤20	75 000	67 000	7	
	0.250-0.499	≤20	77 000	68 000	7	QQ-A-200/12c
	0.500-1.499	≤20	78 000	70 000	7	
7178-T62	≤0.061	≤20	79 000	73 000	5	
	0.250-2.499	≤25	86 000	77 000	5	
-T6510	0.062-0.249	≤20	[illegible]	76 000	5	QQ-A-200/13a
	0.250-1.499	≤25	87 000	78 000	5	
	1.500-2.499	≤25	86 000	77 000	5	

† Offset equals 0.2 per cent.
‡ In QQ-A-200/8c, 11c and 12c values for T6 temper apply also for extrusions heat treated and aged by user (T62 temper).
* Temper designation not strictly correct for "Heat Treated By User." Suitable number not yet assigned.
§ Not shown in Federal Specification
** Elongation requirements not applicable for material thinner than 0.062 in. (nominal)

TABLE XII

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 2014-T6510 ALUMINUM ALLOY EXTRUSIONS

[illegible]

Section Thickness, in.	Cross-Sectional Area, sq in.	Number	Type*	[illegible]	[illegible]	[illegible]	[illegible]	CY(L)/TYS(L)	[illegible]	CY(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
0.0[illegible]	0.[illegible]	[illegible]	T[illegible]	[illegible]	--	[illegible]	--	[illegible]	--	--	--	--	--
[illegible]	[illegible]	[illegible]*	T[illegible]	--	--	--	--	[illegible]	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T[illegible]	--	--	--	--	[illegible]	--	--	--	--	--
[illegible]	0.[illegible]	[illegible]*	T[illegible]	--	--	--	--	[illegible]	--	--	0.5[illegible]	--	--
0.[illegible]50	[illegible]	[illegible]	T	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]0	--
0.[illegible]	[illegible]	[illegible]	T	[illegible]	--	[illegible]	--	[illegible]	--	--	0.[illegible]0	--	--
[illegible]	0.[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	--	--	0.[illegible]	--	--
[illegible]	0.[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	--	--	0.[illegible]4	--	--
[illegible]	--	[illegible]	[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
			[illegible]		--	[illegible]	--	[illegible]		--	[illegible]	[illegible]	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	0.[illegible]	--	[illegible]	[illegible]	--	0.[illegible]	--	--
[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	--	--	0.5[illegible]	--	--
[illegible]	[illegible]		[illegible]	[illegible]	--	0.[illegible]	--	[illegible]	--	--	0.5[illegible]	--	--
			[illegible]		--		--		--	--	0.[illegible]	--	--
			[illegible]		--	[illegible]	[illegible]	[illegible]	[illegible]	--	0.[illegible]	[illegible]	--

* T - Thickness; W - Width; D - Diameter

* Produced [illegible] all others from [illegible]

TABLE XIII

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T351X ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	[illegible]	[illegible]	[illegible]
0.075	0.70	318132†	T/2	1.07	--	0.91	--	0.85	1.03	--	--	--	--
0.094	0.30	318019†	T/2	--	--	--	--	1.10	--	--	--	--	--
0.102	0.33	317885	T/2	--	--	--	--	0.85	--	--	--	--	--
0.105	0.31	317904	T/2	--	--	--	--	0.81	--	--	--	--	--
0.120	0.27	318018†‡	T/2	--	--	--	--	0.83	--	--	--	-	--
0.151	0.82	317885	T/2	0.97	--	0.92	--	0.83	1.01	--	--	--	--
0.255	2.8	317942	T/2	0.96	--	0.90	--	0.84	[illegible]	--	[illegible]	[illegible]	--
0.256	[illegible]	318047	T/2	0.94	--	0.89	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
[illegible]	0.62	317943	T/2	0.90	--	0.79	--	[illegible]	--	--	[illegible]	--	--
0.510	10.1	317926	T/2,W/2	0.86	--	0.85	--	0.86	[illegible]	--	[illegible]	[illegible]	--
0.525	1.9	318020†	T/2,W/4	0.98	--	[illegible]	--	[illegible]	-	-	[illegible]	--	--
			T/2,W/[illegible]	1.01	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
0.550	1.9	317856	T/2,W/4	0.91	--	0.85	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
0.542	5.8	317945	T/2,W/4	0.84	--	0.79	--	0.85	[illegible]	--	[illegible]	[illegible]	--
0.815	3.9	340418†	T/2,W/4	0.87	--	0.83	--	0.94	[illegible]	--	[illegible]	--	--
			T/2,W/2	0.91	--	0.87	--	0.89	[illegible]	--	[illegible]	[illegible]	--
0.950	4.6	317944	T/2,W/4	0.86	--	0.83	--	0.90	[illegible]	--	[illegible]	--	--
1.150	5.6	318077	T/2,W/4	0.87	--	0.85	--	0.90	[illegible]	--	[illegible]	--	--
			T/2,W/[illegible]	0.91	--	0.86	--	0.86	[illegible]	--	[illegible]	[illegible]	--
1.200	3.9	317946	T/2,W/4	0.84	--	0.78	--	0.91	[illegible]	--	[illegible]	--	--
1.450	7.3	318021†‡	T/2,W/4	0.85	--	0.77	--	0.93	0.84	--	[illegible]	[illegible]	--
			T/2,W/2	0.86	--	0.81	--	0.93	[illegible]	--	[illegible]	[illegible]	--
1.705	4.8	340213	T/4,W/4	0.85	--	0.78	--	0.95	--	--	[illegible]	--	--
			T/2,W/2	0.84	--	0.80	--	0.98	0.85	--	0.46	[illegible]	--
2.520	8.8	318133†	T/4,W/4	0.83	--	0.75	--	0.96	0.81	--	[illegible]	--	--
			T/2,W/2	0.83	0.81	0.76	0.71	0.96	[illegible]	[illegible]	0.45	0.47	0.52
4.000	24.0	340214	T/4,W/4	0.81	--	0.77	--	0.93	0.87	--	0.46	0.46	--
			T/2,W/2	0.80	0.77	0.79	0.71	0.94	0.84	0.82	[illegible]	[illegible]	0.51
2.760	29.6	318048	T/4,W/4	0.76	--	0.74	--	0.93	0.81	--	0.53	0.48	--
			T/2,W/2	0.79	0.77	0.80	0.72	0.93	0.84	0.81	0.51	[illegible]	0.51
4.500	30.7	340388	T/4,W/4	0.81	--	0.75	--	0.97	0.81	--	0.49	0.47	--
			T/2,W/2	0.83	0.78	0.82	0.71	0.95	0.85	0.83	0.50	0.47	0.51

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 temper. All others T3510.

TABLE XIV

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 2024-T851X ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Sample Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
0.075	0.70	318022†	T/2	1.07	--	1.02	--	1.02	1.07	--	--	--	--
0.094	0.30	318134†	T/2	--	--	--	--	0.95	--	--	--	--	--
0.101	0.33	317887	T/2	--	--	--	--	1.02	--	--	--	--	--
0.106	0.31	317888	T/2	--	--	--	--	1.01	--	--	--	--	--
0.120	0.27	318023†	T/2	--	--	--	--	1.00	--	--	--	--	--
0.151	0.82	317889	T/2	1.05	--	1.05	--	1.05	1.04	--	--	--	--
0.255	2.8	317890	T/2	0.99	--	1.02	--	1.06	1.04	--	0.57	0.55	--
0.258	4.2	318082	T/2	0.9[illegible]	--	1.02	--	1.0[illegible]	1.05	--	0.58	0.5[illegible]	--
0.375	0.62	317891	T/2	0.97	--	0.95	--	0.97	--	--	0.62	--	--
0.510	10.1	317892	T/2,W/2	0.97	--	1.00	--	1.06	1.05	--	0.57	0.56	--
0.525	1.9	318024†	T/2,W/4	0.98	--	0.99	--	1.03	--	--	0.63	--	--
			T/2,W/2	0.99	--	1.01	--	1.05	1.00	--	0.57	0.57	--
0.550	1.9	317922	T/2,W/4	0.97	--	0.99	--	1.04	1.03	--	0.56	0.56	--
0.642	5.8	317894	T/2,W/4	0.95	--	0.98	--	1.02	1.02	--	0.55	0.5[illegible]	--
0.815	3.9	340419†	T/2,W/4	0.98	--	1.01	--	1.04	1.03	--	0.55	--	--
			T/2,W/2	0.99	--	1.03	--	1.05	1.04	--	0.55	0.54	--
0.950	4.6	317893	T/2,W/4	0.95	--	0.96	--	0.98	0.99	--	0.57	--	--
1.150	5.6	318078	T/2,W/4	0.97	--	1.02	--	1.04	1.05	--	0.56	--	--
			T/2,W/2	0.99	--	1.03	--	1.06	1.04	--	0.57	0.56	--
1.200	3.9	317895	T/2,W/4	0.96	--	0.98	--	1.03	1.03	--	0.56	--	--
1.450	7.3	318025†§	T/2,W/4	0.94	--	0.98	--	1.02	1.00	--	0.56	--	--
			T/2,W/2	0.95	--	0.97	--	1.02	1.00	--	0.56	0.55	--
1.705	4.8	340169	T/4,W/4	0.99	--	1.00	--	1.04	--	--	0.56	--	--
			T/2,W/2	0.97	--	0.98	--	1.00	1.01	--	0.54	0.53	--
2.520	8.8	340420†	T/4,W/4	0.99	--	1.03	--	1.04	1.06	--	0.56	--	--
			T/2,W/2	0.97	0.97	1.01	0.99	1.04	1.04	1.06	0.54	0.55	0.5[illegible]
2.760	29.6	318079	T/4,W/4	0.92	--	0.96	--	1.02	1.02	--	0.58	0.56	--
			T/2,W/2	0.94	0.91	0.98	0.94	1.01	1.01	1.02	0.58	0.53	[illegible]
4.000	24.0	340225	T/4,W/4	0.97	--	1.00	--	1.02	1.02	--	0.56	0.53	--
			T/2,W/2	0.97	0.93	1.00	0.96	1.01	1.01	1.03	0.56	0.53	[illegible]
4.500	30.7	340389	T/4,W/4	0.97	--	0.99	--	1.02	1.02	--	0.57	0.54	--
			T/2,W/2	0.99	0.97	1.03	0.99	1.01	1.02	1.06	0.57	0.55	[illegible]

* T - Thickness; W - Width
† Producer B; all others from Producer A
§ Sample was in the T8[illegible]1 temper. All others T8510.

TABLE XV

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 6061-T6510 ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Sample Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
0.050	0.42	318136†	T/2	--	--	--	--	0.98	--	--	--	--	--
0.075	0.59	317657	T/2	0.98	--	0.95	--	1.02	0.99	--	--	--	
0.090	0.27	318027†	T/2	--	--	--	--	0.96	--	--	--	--	
0.125	0.61	317846	T/2	0.97	--	0.93	--	1.00	1.00	--	--	--	--
0.126	0.30	317847	T/2	--	--	--	--	1.00	--	--	[illegible]	--	--
0.180	1.6	340482	T/2	0.95	--	[illegible]	--	1.01	[illegible]	--	--	--	--
0.245	1.1	340421†	T/2	1.00	--	0.96	--	0.98	1.07	--	0.77	0.78	--
0.250	0.36	317848	T/2	--	--	--	--	1.01	--	--	0.72	--	--
0.254	0.97	340422†	T/2	1.07	--	1.01	--	1.01	1.10	--	[illegible]	[illegible]	--
0.310	6.3	317905	T/2	1.03	--	1.00	--	0.98	1.04	--	0.55	0.64	--
0.315	5.8	317953	T/2	0.98	--	0.95	--	1.00	1.00	--	0.76	0.74	--
0.375	8.6	317927	T/2	0.99	--	0.95	--	0.99	1.00	--	0.80	[illegible]	--
0.375	7.7	318083	T/2	0.94	--	0.97	--	0.98	0.99	--	0.76	0.73	--
0.918	1.3	317906	T/2,W/2	0.99	--	0.98	--	1.00	1.04	--	0.72	--	--
1.004	2.0	340423†	T/2,W/4	--	--	--	--	0.95	--	--	0.69	--	--
			T/2,W/2	1.04	--	0.97	--	0.97	1.06	--	0.71	0.67	--
1.240	2.7	317907	T/2,W/4	--	--	--	--	1.04	--	--	0.60	--	--
			T/2,W/2	0.89	--	0.86	--	1.01	0.94	--	0.58	--	--
1.490	4.5	340489†	T/2,W/4	0.88	--	0.85	--	1.01	0.92	--	0.51	--	--
			T/2,W/2	0.91	--	0.89	--	1.01	0.95	--	0.55	0.53	--
1.960	4.4	317896	T/2,W/4	--	--	--	--	1.00	--	--	0.57	--	--
			T/2,W/2	0.87	--	0.83	--	1.01	0.91	--	0.56	--	--
3.000	15.0	340226	T/4,W/4	0.90	--	0.86	--	1.00	0.93	--	0.53	0.52	--
			T/2,W/2	0.90	0.91	0.90	0.84	1.00	0.93	0.92	0.53	0.52	0.55
6.500	33.2	317897	D/4	0.87	--	0.82	--	1.00	0.88	--	0.52	0.52	--
			D/2	0.86	--	0.81	--	1.00	0.87	--	0.53	0.52	--

* T - Thickness; W - Width; D - Diameter
† Producer B; all others from Producer A

TABLE XVI

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 7075-T6510 ALUMINUM ALLOY EXTRUSIONS

DF33(615)-3580

Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
0.065	0.18	317889	T/2	--	--	--	--	0.95	--	--	--	--	--
0.065	0.27	318031†	T/2	0.97	--	0.96	--	0.99	1.00	--	--	--	--
0.080	0.18	317858	T/2	--	--	--	--	0.98	--	--	--	--	--
0.133	0.97	318029†	T/2	0.98	--	0.96	--	1.01	1.03	--	--	--	--
0.153	4.0	340390	T/2	1.02	--	1.02	--	1.00	1.10	--	--	--	--
0.160	0.26	318030†	T/2	--	--	--	--	1.04	--	--	--	--	--
0.209	1.2	340403	T/2	0.96	--	0.97	--	1.07	1.10	--	0.56	0.53	--
0.260	1.2	318028†	T/2	0.98	--	0.96	--	1.01	--	--	0.57	--	--
0.313	0.51	317906	T/2	--	--	--	--	1.03	--	--	0.55	--	--
0.325	2.4	340437	T/2	1.01	--	0.99	--	1.00	1.05	--	0.54	0.53	--
0.375	2.2	317954	T/2	0.95	--	0.92	--	0.98	1.01	--	0.55	0.54	--
0.438	7.2	317859	T/2	0.96	--	0.97	--	1.00	1.07	--	0.57	0.55	--
0.463	1.9	318032†	T/2	0.94	--	0.93	--	1.02	1.02	--	0.56	0.54	--
0.935	7.2	340155	T/2,W/4	0.95	--	0.93	--	0.98	0.99	--	0.54	0.52	--
			T/2,W/2	0.96	--	0.95	--	0.97	1.00	--	0.54	0.53	--
1.027	1.8	318033†	T/2,W/4	--	--	--	--	1.02	--	--	0.53	--	--
1.188	27.1	317860	T/2,W/4	0.97	--	0.96	--	1.00	1.02	--	0.59	0.55	--
			T/2,W/2	0.98	--	0.96	--	0.99	1.03	--	0.57	0.56	--
[illegible]	[illegible]	326914	T/2,W/4	[illegible]	--	[illegible]	--	[illegible]	1.02	--	[illegible]	[illegible]	--
			T/2,W/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
1.500	1.8	317955	D/2	0.83	--	0.78	--	1.01	--	--	0.51	--	--
2.000	3.1	317861	D/4	--	--	--	--	1.00	--	--	0.53	--	--
			D/2	0.87	--	0.82	--	1.01	0.89	--	0.52	--	--
2.190	17.0	318137†	T/4,W/4	0.89	--	0.91	--	1.00	1.01	--	0.55	0.54	--
			T/2,W/2	0.95	0.86	0.94	0.84	0.99	1.00	0.98	0.53	0.51	--
2.750	8.2	340404	T/4,W/4	0.88	--	0.84	--	1.02	0.93	--	0.53	0.52	--
			T/2,W/2	0.88	0.88	0.85	0.83	1.02	0.93	0.92	0.53	0.52	0.55
2.812	12.3	340494	T/4,W/4	0.88	--	0.85	--	1.01	0.92	--	0.54	--	--
			T/2,W/2	0.87	0.84	0.84	0.81	1.01	0.92	0.90	0.52	0.51	0.53
3.040	13.8	318138†	T/4,W/4	0.88	--	0.85	--	1.02	0.93	--	0.53	--	--
			T/2,W/2	0.89	0.87	0.87	0.82	1.01	0.95	0.92	0.54	0.52	0.55
3.090	24.3	340391	T/4,W/4	0.93	--	0.91	--	1.00	0.98	--	0.54	0.51	--
			T/2,W/2	0.92	0.89	0.91	0.84	0.99	0.98	0.96	0.53	0.52	0.53
5.000	30.0	340503	T/4,W/4	0.86	--	0.82	--	1.02	0.91	--	0.53	0.52	--
			T/2,W/2	0.87	0.87	0.83	0.80	0.97	0.91	0.90	0.54	0.51	0.53

* T - Thickness; W - Width, D - Diameter
† Producer B; all others from Producer A

TABLE XVII

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 7075-T73510 ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	[illegible]	[illegible]
0.080	0.18	317862	T/2	--	--	--	--	1.00	--	--	--	--	--
0.209	1.2	340393	T/2	0.97	--	0.98	--	1.04	1.03	--	0.55	[illegible]	--
0.313	0.51	317909	T/2	--	--	--	--	1.05	--	--	[illegible]	--	--
0.325	2.4	340436	T/2	[illegible]	--	1.02	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
0.375	2.2	317900	T/2	[illegible]	--	0.97	--	1.02	1.04	--	[illegible]	[illegible]	--
0.438	7.2	317910	T/2	[illegible]	--	[illegible]	--	1.03	[illegible]	--	[illegible]	[illegible]	-
0.935	7.2	340292	T/2,W/4	0.97	--	0.96	--	1.00	1.02	--	[illegible]	[illegible]	--
			T/2,W/2	[illegible]	--	0.97	--	1.00	1.02	--	[illegible]	[illegible]	--
1.000	5.7	340439	T/2,W/4	0.96	--	0.94	--	1.00	[illegible]	--	[illegible]	[illegible]	--
			T/2,W/2	0.96	--	0.97	--	1.00	1.00	--	[illegible]	[illegible]	--
1.138	27.1	326912	T/2,W/4	[illegible]	--	[illegible]	--	1.02	[illegible]	--	[illegible]	0.58	--
			T/2,W/2	[illegible]	--	[illegible]	--	0.99	1.03	--	[illegible]	[illegible]	--
1.500	1.8	317956	L/2	0.90	--	[illegible]	--	1.02	--	--	[illegible]	--	--
2.000	3.1	317948	D/4	--	--	--	--	1.02	--	--	[illegible]	--	--
			D/2	0.90	--	0.86	--	1.02	0.93	--	[illegible]	--	--
2.750	8.2	340440	T/4,W/4	[illegible]	--	0.90	--	1.01	[illegible]	--	[illegible]	[illegible]	--
			T/2,W/2	0.92	0.93	0.89	0.89	1.01	0.95	0.96	[illegible]	[illegible]	[illegible]
2.812	11.3	340495	T/4,W/4	[illegible]	--	0.91	--	1.02	0.97	--	0.57	--	--
			T/2,W/2	[illegible]	0.90	0.90	0.88	1.02	0.95	0.94	0.56	0.55	[illegible]
3.090	24.3	340392	T/4,W/4	0.95	--	0.95	--	1.00	0.99	--	[illegible]	0.55	--
			T/2,W/2	0.94	0.92	0.93	0.89	1.00	0.98	0.97	0.55	[illegible]	[illegible]
5.000	30.0	340504	T/4,W/4	0.92	--	0.89	--	1.02	0.96	--	0.58	0.55	--
			T/2,W/2	[illegible]	0.93	0.89	0.88	1.00	0.95	0.94	0.56	[illegible]	[illegible]

* T - Thickness; W - Width; L - Diameter

TABLE [illegible]

[illegible] OF STRESS-[illegible] ALUMINUM ALLOY EXTRUSIONS

[illegible]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Location*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
0.0[illegible]	[illegible]	340405	T[illegible]	--	--	--	--	[illegible]	--	--	--	--	--
0.060	0.45	340490[illegible]	T/2	--	--	--	--	1.02	--	--	--	--	--
0.146	[illegible]	340405	T[illegible]	[illegible]	--	[illegible]	--	[illegible]	1.06	--	--	--	--
0.1[illegible]	0.7[illegible]	3402[illegible]	T[illegible]	[illegible]	--	[illegible]	--	[illegible]	1.06	--	--	--	--
0.251	0.92	340253	T[illegible]	[illegible]	--	[illegible]	--	[illegible]	1.01	--	0.56	0.5[illegible]	--
0.500	4.2	340[illegible]	T/[illegible]	[illegible]	--	[illegible]	--	[illegible]	1.04	--	0.54	0.5[illegible]	--
			T[illegible]	[illegible]	--	[illegible]	--	[illegible]	1.03	--	0.55	0.54	--
0.535	[illegible]	340[illegible]	[illegible]	[illegible]	--	[illegible]	--	[illegible]	--	--	0.55	--	--
			T[illegible]	[illegible]	--	[illegible]	--	[illegible]	0.96	--	0.53	0.5[illegible]	--

* T = Thickness [illegible]

[illegible]

TABLE XIX

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED 7178-T6510 ALUMINUM ALLOY EXTRUSIONS

[AF33(616)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Location*	TS(LT)/TS(L)	TS(ST)/TS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
0.066	0.35	340-26*	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
[illegible]	1.0	[illegible]	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
[illegible]	0.40	[illegible]	T/2	--	--	--	--	[illegible]	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	--	--	--	--	[illegible]	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	0.94	--	[illegible]	--	[illegible]	--	--	[illegible]	--	--
[illegible]	[illegible]	[illegible]	T/2	--	--	--	--	[illegible]	--	--	[illegible]	[illegible]	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	-	[illegible]	[illegible]	--	[illegible]	[illegible]	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
			[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
0.790	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	[illegible]	--	--	[illegible]	--	--
			[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
1.200	3.9	318139*	[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
			[illegible]	[illegible]	--	[illegible]	--	[illegible]	--	--	0.53	--	--
			[illegible]	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
1.438	6.4	317257	T/2	0.84	--	0.81	--	1.02	--	--	[illegible]	--	--
1.500	11.3	340557	T/2,W/4	[illegible]	--	[illegible]	--	[illegible]	1.00	--	0.54	[illegible]	--
			T/2,W/2	[illegible]	--	[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--
2.180	15.5	318140*	T/4,W/2	0.91	--	0.90	--	[illegible]	0.99	--	[illegible]	[illegible]	--
			T/2,W/2	[illegible]	0.86	[illegible]	[illegible]	1.01	1.00	[illegible]	0.53	[illegible]	--

* T - Thickness; W - Width

* Producer B; all others from Producer A

TABLE XX

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES OF ALUMINUM ALLOY EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPERS

[AF33(615)-3580]

Alloy and Temper	Sample Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Sample Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
2014-T62	0.185	1.0	340240†	T/2	1.05	--	1.02	--	1.06	1.09	--	--	--	--
	0.300	6.3	318064	T/2	1.01	--	0.94	--	1.04	1.08	--	0.58	0.56	--
	0.499	1.4	318085	T/2	0.98	--	0.98	--	1.06	1.03	--	0.63	--	--
	3.250	8.3	340543†	D/4	0.92	--	0.92	--	1.04	0.95	--	0.57	--	--
				D/2	0.92	--	0.92	--	1.04	0.97	--	0.56	0.54	--
2024-T42	0.064	0.27	318088†	T/2	1.06	--	0.98	--	1.01	1.07	--	--	--	--
	0.083	0.27	318086	T/2	1.02	--	1.02	--	1.06	1.06	--	--	--	--
	0.430	2.1	340241†	T/2	1.00	--	0.99	--	1.02	1.05	--	0.54	0.52	--
	0.500	0.64	340243	T/2	0.90	--	0.87	--	1.01	--	--	0.49	--	--
	2.562	6.4	340245	T/4,W/4	0.85	--	0.81	--	1.00	0.85	--	0.50	--	--
				T/2,W/2	0.76	0.79	0.80	0.76	1.01	0.84	0.84	0.48	0.48	0.52
2024-T62	0.064	0.27	318089†	T/2	1.06	--	1.01	--	0.99	1.05	--	--	--	--
	0.083	0.27	318087	T/2	1.03	--	0.96	--	1.07	1.03	--	--	--	--
	0.430	2.1	340242†	T/2	0.96	--	1.00	--	1.06	1.06	--	0.57	0.55	--
	0.500	0.64	340244	T/2	0.95	--	0.96	--	1.04	--	--	0.56	--	--
	2.562	6.4	340246	T/4,W/4	0.93	--	0.95	--	1.02	1.01	--	0.56	--	--
				T/2,W/2	0.91	0.93	0.96	0.96	1.04	1.00	1.03	0.56	0.54	0.57
6061-T62	0.125	2.2	340546	T/2	0.94	--	0.91	--	1.02	0.98	--	--	--	--
	0.245	4.6	318090	T/2	0.96	--	0.95	--	1.03	1.00	--	0.74	0.73	--
	1.025	3.9	318091	T/4,W/4	0.98	--	0.96	--	1.03	--	--	0.70	--	--
				T/2,W/2	0.99	--	0.97	--	1.03	1.04	--	0.71	0.68	--
7075-T62	0.063	0.34	318094†	T/2	0.98	--	0.99	--	1.06	1.09	--	--	--	--
	0.126	0.17	318092	T/2	--	--	--	--	1.06	--	--	--	--	--
	0.350	1.7	318095	T/2	0.93	--	0.93	--	1.04	1.03	--	0.54	0.52	--
	1.225	21.2	318096†	T/2,W/4	0.93	--	0.92	--	1.05	1.02	--	0.55	0.53	--
				T/2,W/2	0.95	--	0.95	--	1.05	1.03	--	0.56	0.54	--
	2.250	4.1	318100	D/4	--	--	--	--	1.03	--	--	0.53	--	--
				D/2	0.86	--	0.81	--	1.02	0.88	--	0.53	0.52	--
	2.812	11.3	340547	T/4,W/4	0.89	--	0.87	--	1.03	0.92	--	0.54	--	--
				T/2,W/2	0.89	0.88	0.87	0.83	1.04	0.93	0.89	0.54	0.53	0.53
7075-T73‡	0.063	0.34	318095†	T/2	0.99	--	0.96	--	1.03	1.06	--	--	--	--
	0.126	0.17	318093	T/2	--	--	--	--	0.97	--	--	--	--	--
	0.350	1.7	318097	T/2	0.97	--	0.96	--	1.07	1.02	--	0.57	0.55	--
	1.225	21.2	318099†	T/2,W/4	0.94	--	0.95	--	1.06	1.02	--	0.57	0.55	--
				T/2,W/2	0.96	--	0.97	--	1.05	1.03	--	0.57	0.56	--
	2.250	4.1	318101	D/4	--	--	--	--	1.02	--	--	0.57	--	--
				D/2	0.93	--	0.89	--	1.03	0.94	--	0.56	0.57	--
	2.812	11.3	340548	T/4,W/4	0.96	--	0.92	--	1.03	0.96	--	0.56	--	--
				T/2,W/2	0.96	0.92	0.95	0.93	1.04	0.97	0.93	0.58	0.57	0.57
7079-T62	0.222	0.66	340549	T/2	0.97	--	0.96	--	1.06	0.96	--	0.56	--	--
7178-T62	0.050	0.15	340247	T/2	0.99	--	0.99	--	1.05	--	--	--	--	--
	0.051	0.27	318102†	T/2	--	--	--	--	1.09	--	--	--	--	--
	0.403	3.0	340249	T/2	0.96	--	0.92	--	1.03	1.04	--	0.53	0.51	--
	1.500	11.3	340553	T/2,W/4	0.94	--	0.94	--	1.05	1.00	--	0.54	0.53	--
				T/2,W/2	0.94	--	0.92	--	1.04	1.02	--	0.55	0.53	--

* T - Thickness; W - Width; D - Diameter

† Producer B; all others Producer A

‡ Temper designation not strictly correct. Suitable number not yet assigned

TABLE [illegible]

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED 201—T6510 ALUMINUM ALLOY EXTRUSIONS

[AP[illegible](615)-356C]

Sample				Flatwise								Edgewise							
Thickness, in.	Cross-Sectional Area, in.²	Number	Location*	BUS(L)/TUS(L)		BYS(L)/TYS(L)		BUS(LT)/TUS(LT)		BYS(LT)/TYS(LT)		BUS(L)/TUS(L)		BYS(L)/TYS(L)		BUS(LT)/TUS(LT)		BYS(LT)/TYS(LT)	
				e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0
0.061	0.30	317950	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.070	0.24	315517**	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.245	0.45	315130	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.250	3.7	340154	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.271	0.40	317964	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.628	3.4	340486**	T/2,W/4	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.750	1.4	317924	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
1.657	2.2	315046	D/4	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
			D/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
1.755	7.2	340487**	T/4,W/4	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.68	--	--	--	--
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	1.92	[illegible]	1.71	--	--	--	--

* T - Thickness; W - Width; D - Diameter
** Producer B; all others from Producer A

TABLE XXII

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T351X ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Location*	Flatwise BUS(L)/TUS(L) e/D=1.5	Flatwise BUS(L)/TUS(L) e/D=2.0	Flatwise BYS(L)/TYS(L) e/D=1.5	Flatwise BYS(L)/TYS(L) e/D=2.0	Flatwise BUS(LT)/TUS(L) e/D=1.5	Flatwise BUS(LT)/TUS(L) e/D=2.0	Flatwise BYS(LT)/TYS(L) e/D=1.5	Flatwise BYS(LT)/TYS(L) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(L) e/D=1.5	Edgewise BUS(LT)/TUS(L) e/D=2.0	Edgewise BYS(LT)/TYS(L) e/D=1.5	Edgewise BYS(LT)/TYS(L) e/D=2.0
0.075	0.70	318132†	T/2	1.47	1.81	1.48	1.78	--	--	--	--	--	--	--	--	--	--	--	--
0.094	0.30	318019*	T/2	1.52	2.00	1.48	1.75	--	--	--	--	--	--	--	--	--	--	--	--
0.101	0.37	317885	T/2	1.51	1.86	1.43	1.66	--	--	--	--	--	--	--	--	--	--	--	--
0.109	0.31	317904	T/2	1.59	1.95	1.49	1.76	--	--	--	--	--	--	--	--	--	--	--	--
0.120	0.27	318018*‡	T/2	1.56	1.98	1.48	1.77	--	--	--	--	--	--	--	--	--	--	--	--
0.151	0.82	317886	T/2	1.46	1.77	1.44	1.66	--	--	--	--	--	--	--	--	--	--	--	--
0.255	2.8	317942	T/2	1.25	1.56	1.21	1.39	1.33	1.56	1.31	1.61	--	--	--	--	--	--	--	--
0.256	4.2	318047	T/2	1.33	1.66	1.33	1.59	1.34	1.66	1.28	1.50	--	--	--	--	--	--	--	--
0.375	0.62	317943	T/2	1.67	2.09	1.51	2.05	--	--	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317925	T/2,W/2	1.33	1.73	1.36	1.66	--	--	--	--	--	--	--	--	--	--	--	--
0.525	1.9	318020†	T/2,W/2	1.63	1.90	1.52	1.81	--	--	--	--	--	--	--	--	--	--	--	--
0.550	1.9	317856	T/2,W/4	1.33	1.66	1.27	1.55	--	--	--	--	--	--	--	--	--	--	--	--
0.644	5.8	317945	T/2,W/4	1.31	1.66	1.26	1.52	1.31	1.56	1.26	1.51	--	--	--	--	--	--	--	--
0.815	3.9	340418*	T/2,W/4	1.32	1.63	1.24	1.52	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	1.34	1.65	1.27	1.55	--	--	--	--	--	--	--	--	--	--	--	--
0.950	4.6	317944	T/2,W/4	1.27	1.67	1.22	1.49	--	--	--	--	--	--	--	--	--	--	--	--
1.150	5.6	3180[illegible]	T/2,W/4	1.32	1.63	1.27	1.56	1.27	1.60	1.27	1.53	[illegible]	1.58	1.23	1.53	--	--	--	--
			T/2,W/2	1.35	1.69	1.27	1.56	--	--	--	--	--	--	--	--	--	--	--	--
1.200	3.9	317946	T/2,W/4	1.31	1.67	1.19	1.47	--	--	--	--	1.27	1.63	1.23	1.45	--	--	--	--
1.450	7.3	318021*‡	T/2,W/4	1.31	1.64	1.24	1.49	--	--	--	--	1.27	1.53	1.21	1.46	--	--	--	--
			T/2,W/2	1.31	1.62	1.26	1.50	--	--	--	--	1.24	1.56	1.19	1.48	--	--	--	--
1.705	4.8	340213	T/4,W/4	1.34	1.65	1.23	1.54	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	1.32	1.62	1.24	1.50	--	--	--	--	1.30	1.60	1.23	1.49	--	--	--	--
2.520	8.8	318133*	T/4,W/4	1.25	1.59	1.25	1.53	--	--	--	--	1.24	1.56	1.24	1.42	--	--	--	--
			T/2,W/2	1.29	1.62	1.25	1.55	--	--	--	--	1.25	1.55	1.20	1.43	--	--	--	--
4.000	24.0	340214	T/4,W/4	1.26	1.64	1.21	1.47	1.22	1.53	1.30	1.54	1.15	1.57	1.20	1.47	1.09	1.45	1.15	1.42
			T/2,W/2	1.18	1.55	1.27	1.54	--	--	--	--	1.15	1.55	1.20	1.51	--	--	--	--
2.760	29.6	318048	T/4,W/4	1.22	1.53	1.25	1.50	1.20	1.51	1.27	1.55	1.23	1.59	1.24	1.55	1.11	1.44	1.21	1.50
			T/2,W/2	1.26	1.51	1.30	1.50	1.19	1.52	1.24	1.54	1.18	1.54	1.26	1.53	--	--	--	--
4.500	30.[illegible]	340388	T/4,W/4	1.27	1.63	1.21	1.49	1.18	1.47	1.20	1.46	1.21	1.59	1.19	1.46	1.12	1.39	1.15	1.44
			T/2,W/2	1.31	1.67	1.26	1.51	1.24	1.56	[illegible]	1.44	1.22	1.52	1.22	1.48	1.17	1.59	1.15	1.47

* T - Thickness; W - Width
† Producer B; all others from Producer A. All others T3510.
‡ Samples were in the T3511 temper

TABLE XXXIII

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T85X ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Location*	Flatwise BUS(L)/TUS(L) e/D=1.5	Flatwise BUS(L)/TUS(L) e/D=2.0	Flatwise BYS(L)/TYS(L) e/D=1.5	Flatwise BYS(L)/TYS(L) e/D=2.0	Flatwise BUS(LT)/TUS(L) e/D=1.5	Flatwise BUS(LT)/TUS(L) e/D=2.0	Flatwise BYS(LT)/TYS(L) e/D=1.5	Flatwise BYS(LT)/TYS(L) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(L) e/D=1.5	Edgewise BUS(LT)/TUS(L) e/D=2.0	Edgewise BYS(LT)/TYS(L) e/D=1.5	Edgewise BYS(LT)/TYS(L) e/D=2.0
0.075	0.70	318022†	T/2	1.52	1.95	1.45	1.68	--	--	--	--	--	--	--	--	--	--	--	--
0.094	0.30	318134†	T/2	1.50	1.91	1.44	1.71	--	--	--	--	--	--	--	--	--	--	--	--
0.101	0.33	317887	T/2	1.46	1.93	1.37	1.75	--	--	--	--	--	--	--	--	--	--	--	--
0.106	0.31	317888	T/2	1.53	2.04	1.44	1.78	--	--	--	--	--	--	--	--	--	--	--	--
0.120	0.27	318023†	T/2	1.54	2.00	1.44	1.63	--	--	--	--	--	--	--	--	--	--	--	--
0.151	0.82	317889	T/2	1.57	2.03	1.51	1.76	--	--	--	--	--	--	--	--	--	--	--	--
0.255	2.8	317890	T/2	1.46	1.89	1.40	1.66	1.47	1.88	1.41	1.68	--	--	--	--	--	--	--	--
0.258	4.2	318082	T/2	1.48	1.91	1.48	1.69	1.45	1.88	1.44	1.58	--	--	--	--	--	--	--	--
0.375	0.62	317891	T/2	1.53	1.95	1.48	1.62	--	--	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317892	T/2	1.47	1.90	1.47	1.64	--	--	--	--	--	--	--	--	--	--	--	--
0.525	1.9	318024†	T/2,W/2	1.46	1.89	1.43	1.67	--	--	--	--	--	--	--	--	--	--	--	--
0.550	1.9	317922	T/2,W/4	1.47	1.88	1.40	1.66	--	--	--	--	--	--	--	--	--	--	--	--
0.642	5.8	317894	T/2,W/4	1.40	1.80	1.40	1.64	1.41	1.82	1.36	1.63	--	--	--	--	--	--	--	--
0.815	3.9	340419†	T/2,W/4	1.46	1.87	1.40	1.63	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	1.45	1.90	1.4	1.67	--	--	--	--	--	--	--	--	--	--	--	--
0.950	4.6	317893	T/2,W/4	1.41	1.84	1.4	1.64	--	--	--	--	--	--	--	--	--	--	--	--
1.150	5.6	318078	T/2,W/4	1.46	1.87	1.43	1.68	1.45	1.87	1.45	1.70	1.27	1.74	1.36	1.62	--	--	--	--
			T/2,W/2	1.47	1.90	1.45	1.72	--	--	--	--	--	--	--	--	--	--	--	--
1.200	3.9	317895	T/2,W/4	1.42	1.81	1.37	1.61	--	--	--	--	1.36	1.76	1.38	1.61	--	--	--	--
1.450	7.3	318025†§	T/2,W/4	1.43	1.81	1.38	1.64	--	--	--	--	1.36	1.75	1.32	1.60	--	--	--	--
			T/2,W/2	1.41	1.84	1.36	1.65	--	--	--	--	1.35	1.76	1.33	1.61	--	--	--	--
1.705	4.8	340169	T/4,W/4	1.47	1.86	1.42	1.66	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	1.48	1.90	1.39	1.65	--	--	--	--	1.46	1.81	1.38	1.62	--	--	--	--
2.520	8.8	340420†	T/4,W/4	1.48	1.85	1.45	1.64	--	--	--	--	1.39	1.81	1.40	1.67	--	--	--	--
			T/2,W/2	1.41	1.84	1.38	1.63	--	--	--	--	1.35	1.80	1.37	1.65	--	--	--	--
2.760	29.6	318079	T/4,W/4	1.27	1.73	**	1.70	1.35	1.76	1.43	1.66	1.36	1.73	1.43	1.66	1.39	1.80	1.41	1.58
			T/2,W/2	1.34	1.75	1.42	1.67	1.38	1.82	1.39	1.61	1.28	1.69	**	1.71	--	--	--	--
4.000	24.0	340225	T/4,W/4	1.39	1.63	1.42	1.69	1.44	1.88	1.40	1.69	1.33	1.75	1.42	1.70	1.28	1.79	1.37	1.71
			T/2,W/2	1.39	1.85	1.41	1.54	--	--	--	--	1.29	1.70	1.38	1.68	--	--	--	--
4.500	30.7	340329	T/4,W/4	1.41	1.83	1.43	1.71	1.44	1.76	1.42	1.69	1.37	1.77	1.40	1.66	1.32	1.86	1.39	1.67
			T/2,W/2	1.38	1.88	1.44	1.71	1.46	1.93	1.38	1.67	1.36	1.73	1.40	1.69	1.31	1.74	1.35	1.64

* T - Thickness, W - Width
† Producer B; all others from Producer A
§ Sample was in the T8511 temper. All others T8510.
** Bearing specimen failed before reaching yield stress (2 per cent offset).

TABLE XXIV

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED [illegible] ALUMINUM ALLOY EXTRUSIONS

[illegible]

Section Thickness, in.	Cross-Sectional Area, [illegible]	Number	Direction*	[illegible] e/D=1.5	[illegible] e/D=2.0	[illegible] e/D=1.5	[illegible] e/D=2.0	[illegible] e/D=1.5	[illegible] e/D=2.0	[illegible] e/D=1.5	[illegible] e/D=2.0	Edgewise [illegible] e/D=1.5	Edgewise [illegible] e/D=2.0	BYS(?)/TYS(?) e/D=1.5	BYS(?)/TYS(?) e/D=2.0	BUS(LT)/TUS(L?) e/D=1.5	BUS(LT)/TUS(L?) e/D=2.0	BYS(LT)/TYS(L) e/D=1.5	BYS(LT)/TYS(L) e/D=2.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	--	--	--	--	--	--	--	--	--
0.2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	--	--	--	--	--	--	--
0.3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	1.44	1.72	--	--	--	--
1.004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	1.46	1.[illegible]	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.64	--	--	--	--
1.240	[illegible]	[illegible]	[illegible]	1.40	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--
1.25[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.45	--	--	--	--
1.960	4.[illegible]	[illegible]	[illegible]	1.4[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.50	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.47	1.35	1.78	1.21	1.47
3.000	[illegible]	[illegible]	[illegible]	1.4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	[illegible]	[illegible]	[illegible]	1.41	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.6[illegible]	[illegible]	1.54	1.33	1.66	1.19	1.46
6.500	[illegible]	[illegible]	[illegible]	1.40	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--

* [illegible] Thickness; [illegible] Width; [illegible] Diameter

* [illegible] all other [illegible]

TABLE XXV

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T6510 ALUMINUM ALLOY EXTRUSIONS

[AF33(616)-3550]

Section Thickness, in.	Cross-Sectional Area, in.²	Number	Location*	Stripwise BUS(L)/TUS(L) e/D=1.5	Stripwise BUS(L)/TUS(L) e/D=2.0	Stripwise BYS(L)/TYS(L) e/D=1.5	Stripwise BYS(L)/TYS(L) e/D=2.0	Stripwise BUS(LT)/TUS(LT) e/D=1.5	Stripwise BUS(LT)/TUS(LT) e/D=2.0	Stripwise BYS(LT)/TYS(LT) e/D=1.5	Stripwise BYS(LT)/TYS(LT) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(LT) e/D=1.5	Edgewise BUS(LT)/TUS(LT) e/D=2.0	Edgewise BYS(LT)/TYS(LT) e/D=1.5	Edgewise BYS(LT)/TYS(LT) e/D=2.0
0.064	0.1[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.150	0.22	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	340403	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.2[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
0.4[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.335	7.2	340255	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
1.168	27.1	327560	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.27	1.47	1.29	[illegible]	1.25	1.51
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.53	1.36	1.74	1.26	1.50
1.395	27.1	326914	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.70	1.27	1.52	[illegible]	1.77	1.26	1.57
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.74	1.26	1.53	1.26	1.76	1.24	1.46
1.500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
2.000	[illegible]	327951	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
2.190	27.0	318137†	T/2,W/4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.60	1.19	1.56	1.27	1.57
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	1.47	[illegible]	1.42	1.64	1.24	1.67	[illegible]	1.64	1.25	1.66	1.29	1.58
2.750	8.2	340404	T/4,W/4	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	1.70	1.27	1.48	--	--	--	--
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	1.72	1.26	1.46	--	--	--	--
2.812	11.3	340474	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	1.74	1.23	1.47	--	--	--	--
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	1.19	1.43	--	--	--	--
3.040	13.5	318135*	T/4,W/4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.50	[illegible]	[illegible]	[illegible]	1.55	1.31	1.69	1.27	1.58
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.55	--	--	--	--
3.090	24.3	340[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.27	[illegible]	[illegible]	[illegible]	1.28	1.68	1.23	1.52
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.24	1.52	1.24	1.61	1.22	1.51
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.67	1.24	1.40	1.22	1.63	1.23	1.48
5.000	30.0	34050[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	1.35	1.74	1.27	1.50	--	--	--	--

* T = Thickness, W = Width, D = Diameter

* Producer B; all others from Producer A

TABLE XX

RATIOS OF BEARING TO TENSILE PROPERTIES [illegible] LEVEL STRETCHED
[illegible] ALUMINUM ALLOY [illegible]

AF33(616)-3560

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Location*	Flatwise BUS(L)/TUS(L) e/D=1.5	Flatwise BUS(L)/TUS(L) e/D=2.0	Flatwise BYS(L)/TYS(L) e/D=1.5	Flatwise BYS(L)/TYS(L) e/D=2.0	Flatwise BUS(LT)/TUS(LT) e/D=1.5	Flatwise BUS(LT)/TUS(LT) e/D=2.0	Flatwise BYS(LT)/TYS(LT) e/D=1.5	Flatwise BYS(LT)/TYS(LT) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(LT) e/D=1.5	Edgewise BUS(LT)/TUS(LT) e/D=2.0	Edgewise BYS(LT)/TYS(LT) e/D=1.5	Edgewise BYS(LT)/TYS(LT) e/D=2.0
0.051	0.15	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.205	1.2	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	2.4	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	1.48	1.92	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.438	[illegible]	317310	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	340293	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.82	1.35	[illegible]	--	--	--	--	--	--	--	--
1.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.66	[illegible]	[illegible]	[illegible]	[illegible]	1.35	1.78	.29	1.57
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.66	[illegible]	[illegible]	.27	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
2.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
2.750	[illegible]	340440	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	1.70	[illegible]	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.60	1.35	[illegible]	[illegible]	1.50
5.000	30.0	340504	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.64	[illegible]	1.76	[illegible]	[illegible]

* T = Thickness; W = Width; [illegible]

TABLE XXVII

RATIOS OF BEARING TO TENSILE PROPERTIES OF [illegible]SS-RELIEVED STRETCHED 7079-T6510 ALUMINUM ALLOY [illegible]USIONS

[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Number	Location*	Flatwise BUS(L)/TUS(L) e/D=1.5	Flatwise BUS(L)/TUS(L) e/D=2.0	Flatwise BYS(L)/TYS(L) e/D=1.5	Flatwise BYS(L)/TYS(L) e/D=2.0	Flatwise BUS(LT)/TUS(L) e/D=1.5	Flatwise BUS(LT)/TUS(L) e/D=2.0	Flatwise BYS(LT)/TYS(L) e/D=1.5	Flatwise BYS(LT)/TYS(L) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(L) e/D=1.5	Edgewise BUS(LT)/TUS(L) e/D=2.0	Edgewise BYS(LT)/TYS(L) e/D=1.5	Edgewise BYS(LT)/TYS(L) e/D=2.0
0.080	0.15	340405	T/2	1.46	1.86	1.35	1.54	--	--	--	--	--	--	--	--	--	--	--	--
0.066	0.45	340490	T/2	[illegible]	[illegible]	1.40	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
0.146	1.1	340406	T/2	1.46	1.89	1.41	1.60	1.50	1.85	1.37	1.62	--	--	--	--	--	--	--	--
0.161	0.72	340252	T/2	1.44	1.81	1.34	1.55	--	--	--	--	--	--	--	--	--	--	--	--
0.251	0.82	340253	T/2	1.46	1.82	1.33	1.50	--	--	--	--	--	--	--	--	--	--	--	--
0.500	4.2	340424†	T/2,W/4	1.43	1.61	1.28	1.50	1.43	1.82	1.29	1.57	--	--	--	--	--	--	--	--
			T/2,W/2	1.44	1.81	1.31	1.50	--	--	--	--	--	--	--	--	--	--	--	--
0.535	1.8	340532	T/2,W/4	1.44	1.64	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	1.46	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† Producer B; all others from Producer A

TABLE XXVIII

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED [illegible] ALUMINUM ALLOY EXTRUSIONS

[AF33(616)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Location*	Flatwise BUS(L)/TUS(L) e/D=1.5	Flatwise BUS(L)/TUS(L) e/D=2.0	Flatwise BYS(L)/TYS(L) e/D=1.5	Flatwise BYS(L)/TYS(L) e/D=2.0	Flatwise BUS(LT)/TUS(LT) e/D=1.5	Flatwise BUS(LT)/TUS(LT) e/D=2.0	Flatwise BYS(LT)/TYS(LT) e/D=1.5	Flatwise BYS(LT)/TYS(LT) e/D=2.0	Edgewise BUS(L)/TUS(L) e/D=1.5	Edgewise BUS(L)/TUS(L) e/D=2.0	Edgewise BYS(L)/TYS(L) e/D=1.5	Edgewise BYS(L)/TYS(L) e/D=2.0	Edgewise BUS(LT)/TUS(LT) e/D=1.5	Edgewise BUS(LT)/TUS(LT) e/D=2.0	Edgewise BYS(LT)/TYS(LT) e/D=1.5	Edgewise BYS(LT)/TYS(LT) e/D=2.0
0.063	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	340425▲	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]▲	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]▲	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	4.6	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]▲	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	T/2,W/4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.66	[illegible]	[illegible]
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.50	[illegible]	[illegible]	1.26	[illegible]	1.23	[illegible]	[illegible]	1.49
1.200	3.9	[illegible]▲	T/2,W/4	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	1.70	1.30	[illegible]	--	--	--	--
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]	[illegible]	[illegible]	1.56	--	--	--	--
[illegible]	6.4	[illegible]	T/2	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--
1.500	21.3	[illegible]	T/2,W/4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.23	1.62	[illegible]	[illegible]
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.30	[illegible]	1.14	1.60	[illegible]	[illegible]
2.180	[illegible]	[illegible]▲	T/4,W/4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			T/2,W/2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.64	1.15	[illegible]	[illegible]	1.57

* T = Thickness, W = Width.
▲ Produced by all [illegible] from [illegible].

TABLE XXIX

RATIOS OF BEARING TO TENSILE PROPERTIES OF ALUMINUM ALLOY EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER

[AF33(616)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Sample: Location*	Flatwise: BUS(L)/TUS(L) e/D=1.5	Flatwise: BUS(L)/TUS(L) e/D=2.0	Flatwise: BYS(L)/TYS(L) e/D=1.5	Flatwise: BYS(L)/TYS(L) e/D=2.0	Flatwise: BUS(LT)/TUS(L) e/D=1.5	Flatwise: BUS(LT)/TUS(L) e/D=2.0	Flatwise: BYS(LT)/TYS(L) e/D=1.5	Flatwise: BYS(LT)/TYS(L) e/D=2.0	Edgewise: BUS(L)/TUS(L) e/D=1.5	Edgewise: BUS(L)/TUS(L) e/D=2.0	Edgewise: BYS(L)/TYS(L) e/D=1.5	Edgewise: BYS(L)/TYS(L) e/D=2.0	Edgewise: BUS(LT)/TUS(L) e/D=1.5	Edgewise: BUS(LT)/TUS(L) e/D=2.0	Edgewise: BYS(LT)/TYS(L) e/D=1.5	Edgewise: BYS(LT)/TYS(L) e/D=2.0
2014-T62	0.185	1.0	340240+	T/2	1.59	2.06	1.50	1.78	--	--	--	--	--	--	--	--	--	--	--	--
	0.300	2.2	318084	T/2	1.51	1.95	1.46	1.71	1.52	1.93	1.44	1.72	--	--	--	--	--	--	--	--
	0.406	1.4	318085	T/2	1.54	1.98	1.43	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	3.250	8.3	340543†	D/4	1.44	1.83	1.32	1.60	--	--	--	--	1.44	1.42	1.34	1.55	--	--	--	--
				D/2	1.45	1.83	1.35	1.56	--	--	--	--	--	--	--	--	--	--	--	--
2024-T42	0.064	0.27	318088+	T/2	1.60	1.89	1.69	1.95	--	--	--	--	--	--	--	--	--	--	--	--
	0.083	0.27	319086	T/2	1.40	1.83	1.76	2.11	--	--	--	--	--	--	--	--	--	--	--	--
	0.430	2.1	340241+	T/2	1.36	1.77	1.44	1.90	--	--	--	--	--	--	--	--	--	--	--	--
	0.500	0.64	340243	T/2	1.35	1.61	1.35	1.65	--	--	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340245	T/4,W/4	1.30	1.64	1.30	1.57	--	--	--	--	1.27	1.59	1.24	1.54	--	--	--	--
				T/2,W/2	1.29	1.61	1.30	1.54	--	--	--	--	1.22	1.56	1.29	1.50	--	--	--	--
2024-T62	0.064	0.27	318089+	T/2	1.64	2.01	1.58	1.87	--	--	--	--	--	--	--	--	--	--	--	--
	0.083	0.27	318087	T/2	1.63	2.02	1.66	2.00	--	--	--	--	--	--	--	--	--	--	--	--
	0.430	2.1	340242+	T/2	1.48	1.92	1.42	1.72	--	--	--	--	--	--	--	--	--	--	--	--
	0.500	0.64	340244	T/2	1.43	1.87	1.39	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	2.561	6.4	340246	T/4,W/4	1.42	1.85	1.43	1.75	--	--	--	--	1.36	1.79	1.40	1.72	--	--	--	--
				T/2,W/2	1.41	1.84	1.50	1.85	--	--	--	--	1.47	1.77	1.53	1.78	--	--	--	--
6061-T62	0.125	2.2	340546	T/2	1.66	2.13	1.56	1.70	1.67	2.21	1.46	1.70	--	--	--	--	--	--	--	--
	0.246	4.6	318090	T/2	1.67	2.27	1.58	1.64	1.72	2.19	1.68	1.95	--	--	--	--	--	--	--	--
	1.625	3.9	318091	T/4,W/4	1.65	2.2[illegible]	1.54	1.80	--	--	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	1.66	2.10	1.67	1.85	--	--	--	--	1.63	2.06	1.63	1.81	--	--	--	--
7075-T62	0.063	0.34	318004+	T/2	1.46	1.89	1.37	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	0.250	1.7	318095	T/2	1.36	1.74	1.3[illegible]	1.54	--	--	--	--	--	--	--	--	--	--	--	--
	1.225	21.2	315098+	T/2,W/4	1.43	1.76	1.41	1.50	--	--	--	--	1.26	1.66	1.36	1.63	--	--	--	--
				T/2,W/2	1.47	1.85	1.44	1.66	1.46	1.79	1.43	1.70	1.32	1.71	1.42	1.69	1.27	1.62	1.35	1.67
	2.250	4.1	318100	D/4	1.32	1.65	1.25	1.47	--	--	--	--	1.35	1.67	1.25	1.49	--	--	--	--
				D/2	1.35	1.65	1.2[illegible]	1.49	--	--	--	--	--	--	--	--	--	--	--	--
	2.812	22.3	340547	T/4,W/4	1.36	1.70	1.26	1.51	--	--	--	--	1.34	1.69	1.26	1.49	--	--	--	--
				T/2,W/2	1.39	1.70	1.26	1.51	--	--	--	--	1.35	1.70	1.27	1.51	--	--	--	--
7075-T73‡	0.063	0.34	318095+	T/2	1.50	1.95	1.42	1.74	--	--	--	--	--	--	--	--	--	--	--	--
	0.250	1.7	318097	T/2	1.47	1.80	1.30	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	1.225	21.2	318099+	T/2,W/4	1.44	1.89	1.41	1.71	--	--	--	--	1.24	1.77	1.36	1.65	--	--	--	--
				T/2,W/2	1.50	1.90	1.47	1.76	1.50	1.[illegible]0	1.43	1.73	1.32	1.72	1.46	1.74	1.34	1.73	1.42	1.72
	2.250	4.1	318101	D/4	1.46	[illegible]	1.35	1.62	--	--	--	--	1.44	1.83	1.33	1.60	--	--	--	--
				D/2	1.60	1.90	1.35	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	2.812	22.3	340548	T/4,W/4	1.51	1.92	1.41	1.64	--	--	--	--	1.47	1.87	1.40	1.66	--	--	--	--
				T/2,W/2	1.49	1.91	1.41	1.72	--	--	--	--	1.49	1.89	1.42	1.71	--	--	--	--
7079-T62	0.222		340541	T/2	1.46	1.91	1.32	1.41	--	--	--	--	--	--	--	--	--	--	--	--
7178-T62	0.050	0.15	340247	T/2	1.40	1.72	1.32	1.51	--	--	--	--	--	--	--	--	--	--	--	--
	0.051	0.20	318102+	T/2	1.44	1.74	1.40	1.64	--	--	--	--	--	--	--	--	--	--	--	--
	0.403	3.0	340249	T/2	1.37	1.71	1.30	1.52	1.44	1.66	1.34	1.67	--	--	--	--	--	--	--	--
	1.500	22.3	340559	T/2,W/4	1.39	1.73	1.32	1.56	1.41	1.69	1.32	1.60	1.25	1.56	1.26	1.51	1.22	1.61	1.25	1.49
				T/2,W/2	1.41	1.75	1.34	1.51	1.39	1.75	1.30	1.54	1.25	1.52	1.31	1.57	1.25	1.66	1.28	1.47

* T - Thickness; W - Width; D - Diameter.
\+ Producer B; all others from Producer A.
‡ Temper designation not strictly correct. Suitable number not yet assigned.

TABLE XXX

STATISTICAL ANALYSES OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 2014-T6510 EXTRUSIONS

(AF33(615)-3560)

Ratio Cell	TYS(LT)/TYS(L) ≤0.499†	TYS(LT)/TYS(L) 0.500-1.750†	CYS(LT)/TYS(L) ≤0.499†	CYS(LT)/TYS(L) 0.500-1.750†	CYS(L)/TYS(L) All†	CYS(LT)/TYS(LT) ≤0.499†	CYS(LT)/TYS(LT) 0.500-1.750†
1.12						1	
1.11	1						
1.10			1				
1.09							
1.08							
1.07							
1.06	2						
1.05							
1.04					1		
1.03			1		2		1
1.02							
1.01			1		4		1
1.00							
0.99		1			1		
0.98							
0.97		1		2	2		
0.96							1
0.95					1		
0.94							
0.93		1					
0.92		1					
0.91				1			
0.90							
0.89				1			
n	3	4	3	4	11	1	3
R̄	1.077	0.953	1.047	0.935	1.002	1.120	1.000
$\sigma_{\bar{R}}$	.01563	.01551	.02726	.02061	0.02646	--	.02062
Min R̄	1.005	0.900	0.930	0.869	0.983	--	0.910

Ratio Cell	SU(L)/TUS(L) ≤0.499†	SU(L)/TUS(L) 0.500-1.750†	SU(LT)/TUS(LT) ≤0.499†	SU(LT)/TUS(LT) 0.500-1.750†	SU(L+LT)*/TUS(L) ≤0.499†	SU(L+LT)*/TUS(L) 0.500-1.750†
0.72	1				1	
0.70	1		1		2	
0.69	1				1	
0.68		1				1
0.67						
0.66						
0.65						
0.64						
0.63		1				1
0.62						
0.61						
0.60						
0.59				1		1
0.58						
0.57		1				1
0.56		1		1		2
0.55						
0.54		1				1
n	3	5	1	2	4	7
R̄	0.700	0.596	0.700	0.575	0.700	0.590
$\sigma_{\bar{R}}$	.00577	.02580	--	--	.00408	.01851
Min R̄	0.675	0.524	--	--	0.687	0.545

e/D = 1.5

Ratio Cell	BYS(L)/TYS(L) ≤0.499†	BYS(L)/TYS(L) 0.500-1.750†	BUS(L)/TUS(L) ≤0.499†	BUS(L)/TUS(L) 0.500-1.750†
1.72	1			
1.71				
1.70				
1.69				
1.68	1			
1.67				
1.66				
1.65				
1.64				
1.63				
1.62				
1.61	1			
1.60				
1.59				
1.58	1			
1.57	1			
1.56			1	
1.55				
1.54				
1.53				
1.52		1		
1.51				
1.50			1	
1.49				
1.48		1		
1.47				
1.46		1	1	
1.45				
1.44				
1.43			1	
1.42			1	1
1.41				
1.40				
1.39				
1.38				1
1.37				
1.36				
1.35				
1.34				
1.33				1
1.32				
n	5	3	5	3
R̄	1.632	1.487	1.474	1.377
$\sigma_{\bar{R}}$	.02922	.01760	.02561	.02601
Min R̄	1.551	1.411	1.403	1.265

e/D = 2.0

Ratio Cell	BYS(L)/TYS(L) ≤0.499†	BYS(L)/TYS(L) 0.500-1.750†
2.18	1	
2.17		
2.16		
2.15		
2.14	1	
2.13		
2.12		
2.11		
2.10		
2.09		
2.08	1	
2.07	2	
2.06		
2.05		
2.04		
2.03		
2.02		
2.01		
2.00		
1.99		
1.98		
1.97		1
1.96		
1.95		
1.94		
1.93		
1.92		1
1.91		
1.90		
1.89		
1.88		
1.87		1
1.86		
n	5	3
R̄	2.108	1.920
$\sigma_{\bar{R}}$	.02222	0.2840
Min R̄	2.046	1.798

Ratio Cell	BUS(L)/TUS(L) ≤0.499†	BUS(L)/TUS(L) 0.500-1.750†
1.82	1	
1.81		
1.80		
1.79		
1.78		
1.77	1	
1.76		
1.75		
1.74		
1.73		
1.72		
1.71		
1.70		
1.69	1	
1.68	1	1
1.67	1	
1.66		
1.65		
1.64		
1.63		1
1.62		
1.61		
1.60		
1.59		
1.58		
1.57		
1.56		1
n	5	3
R̄	1.730	1.625
$\sigma_{\bar{R}}$	.05177	0.3478
Min R̄	1.642	1.412

* Students "t"-test showed no significant difference between average ratios for L and LT directions.
† Thickness Range, in.

TABLE XXX

STATISTICAL ANALYSES OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T3510 AND -T3511 EXTRUSIONS

[AF33(616)-3560]

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*
n	1[illegible]	19	22	1[illegible]	15	1[illegible]	1[illegible]
F	0.[illegible]	0.[illegible]	0.560	0.[illegible]	0.509	0.491	0.502
r	0.02101**	0.00792**	0.00664**	0.00[illegible]75**	--	--	0.00[illegible]**
Min R	0.766-0.[illegible]	0.7[illegible]-0.876	0.516-0.5[illegible]	0.7[illegible]-0.9[illegible]	--	--	0.4[illegible]-0.[illegible]14

e/D=1.5	[illegible]	[illegible]	[illegible]	[illegible]*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*	[illegible]
n	[illegible]	15	4	6	19	6	15	4	6	19
F	1.520	1.[illegible]	1.258	1.520	1.292	1.467	1.249	1.260	1.4[illegible]	1.249
r	.01[illegible]6	--	--	.01966	.00771**	.01018	--	--	.01016	.00885**
Min R	1.46[illegible]	--	--	1.469	1.232-1.302	1.441	--	--	1.44[illegible]	1.196-1.251

e/D=2.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*
n	6	15	4	6	19	6	15	4	6	19
F	1.895	1.634	1.595	1.695	1.626	1.720	1.517	1.535	1.720	1.521
r	.03865	--	--	.03566	.01196**	.01316	--	--	.01316	.01441**
Min R	1.795	--	--	1.735	1.556-1.627	1.686	--	--	1.666	1.443-1.520

* Student's t-test showed no significant difference between average ratios for L and LT directions.
† Omitted
** Regression analysis showed significant relationship with thickness. Value shown is $\sigma_e/\sqrt{n}$
‡ Thickness range, in.

TABLE XXXII

STATISTICAL ANALYSES OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T8510 AND -T8511 EXTRUSIONS

[AF33(615)-3580]

Ratio Cell	TUS(LT)/TUS(L) 0.050-0.249†	TUS(LT)/TUS(L) ≥0.500†	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)
1.07	1			1	1
1.06				2	
1.05	1		1	1	4
1.04				5	2
1.03				2	
1.02			4	7	2
1.01			4	1	1
1.00			1	1	3
0.99		2	1		
0.98		3	2	1	1
0.97		4	1	1	
0.96		1			
0.95		2	1	1	
0.94					
0.93		1			
n	2	13	15	23	14
$\bar{R}$	1.060	0.968	1.003	1.024	1.027
$\sigma_{\bar{R}}$	0.01000	0.00372**	0.00642	0.00593	0.00702
Min $\bar{R}$	0.933	0.950-0.968	1.989	1.012	1.012

Ratio Cell	SU(L)/TUS(L)	SU(LT)/TUS(L)
0.63	1	
0.62	1	
0.61		
0.60		
0.59		
0.58	2	1
0.57	4	1
0.56	7	3
0.55	2	3
0.54		3
0.53		
0.52		1
n	17	12
$\bar{R}$	0.571	0.552
$\sigma_{\bar{R}}$	0.00531	0.00456
Min $\bar{R}$	0.560	0.542

e/D=1.5

Ratio Cell	BUS(L)/TUS(L)	BUS(LT)/TUS(L)	BUS (L+LT)*/TUS(L)	BYS(L)/TYS(L)	BYS(LT)/TYS(L)	BYS (L+LT)*/TYS(L)
1.57	1		1			
1.56						
1.55						
1.54	1		1			
1.53	2		2			
1.52	1		1			
1.51				1		1
1.50	1		1			
1.49						
1.48	2		2	2		2
1.47	3	1	4	1		1
1.46	4		4			
1.45		1	1	2		2
1.44				3	1	4
1.43	1	1	2	2		2
1.42	1		1	2		2
1.41	2		2	1	1	2
1.40	1		1	4		4
1.39	1		1		1	1
1.38		1	1	1		1
1.37				2		2
1.36						
1.35					1	1
1.34						
1.33						
1.32						
1.31						
1.30						
1.29						
1.28						
1.27	1		1			
n	22	4	26	21	4	25
$\bar{R}$	1.460	1.433	1.456	1.428	1.398	1.423
$\sigma_{\bar{R}}$	--	--	0.00946**	--	--	0.00767
Min $\bar{R}$	--	--	1.390-1.465	--	--	1.407

e/D=2.0

Ratio Cell	BUS(L)/TUS(L)	BUS(LT)/TUS(L)	BUS (L+LT)*/TUS(L)
2.04	1		1
2.03	1		1
2.02			
2.01			
2.00	1		1
1.99			
1.98			
1.97			
1.96			
1.95	2		2
1.94			
1.93	1		1
1.92			
1.91	2		2
1.90	1		1
1.89	1		1
1.88	1	3	4
1.87	2		2
1.86	1		1
1.85	1		1
1.84	1		1
1.83	2		2
1.82			
1.81	2	1	3
1.80	1		1
1.79			
1.78			
1.77			
1.76			
1.75			
1.74			
1.73	1		1
n	22	4	26
$\bar{R}$	1.886	1.863	1.882
$\sigma_{\bar{R}}$	--	--	0.00919**
Min $\bar{R}$	--	--	1.769-1.925

Ratio Cell	BYS(L)/TYS(L)	BYS(LT)/TYS(L)
1.78	1	
1.77		
1.76	1	
1.75	1	
1.74		
1.73		
1.72		
1.71	2	
1.70	1	
1.69	2	
1.68	2	1
1.67		
1.66	3	
1.65		
1.64	5	
1.63	2	1
1.62	1	
1.61	1	1
1.60		
1.59		
1.58		1
n	22	4
$\bar{R}$	1.674	1.625
$\sigma_{\bar{R}}$	0.00990	0.02103
Min $\bar{R}$	1.653	1.556

* Student's "t" - test showed no significant difference between average ratios for L and LT directions.
** Regression analysis showed significant relationship with thickness. Value shown is $\sigma_e/\sqrt{n}$
† Thickness range, in.

TABLE XXXIII

STATISTICAL ANALYSIS OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 6061-T6510 EXTRUSIONS

(AFML(51-3560)

n	[illegible]	[illegible]	11	6	20	[illegible]	5	10	[illegible]	[illegible]	3	17	[illegible]
A	[illegible]	0.562	[illegible]	0.350	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
σ	.01176	[illegible]	.00707	.01414	[illegible]	[illegible]	[illegible]	.01234	[illegible]	[illegible]	[illegible]	.01162	[illegible]
R	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.701	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Student's "t"-test showed no significant difference between average ratios for L and LT directions.

* Thickness range, in.

TABLE XXXIV

STATISTICAL ANALYSES OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T6510 EXTRUSION

[illegible]

n	20	20	24	15	1[illegible]	14	23	[illegible]	31	23	6	31	23	8	31	23	8	31
$\bar{C}$ β	0.[illegible]	0.905	1.00[illegible]	0.[illegible]	0.[illegible]	[illegible]	[illegible]	[illegible]	1.4[illegible]	1.32[illegible]	1.45[illegible]	1.3[illegible]	1.610	1.75[illegible]	1.604	1.550	1.604	1.571
$\bar{s}$	0.00[illegible]**	0.0[illegible]**	0.0048[illegible]	0.00[illegible]**	0.00[illegible]**	0.0[illegible]**	--	--	0.00[illegible]**	--	--	0.00[illegible]**	--	--	0.0064[illegible]**	--	--	0.0105[illegible]**
Min & Max	0.[illegible]-0.[illegible]	0.[illegible]-0.[illegible]	0.99[illegible]	0.[illegible]-1.0[illegible]	[illegible]	[illegible]	--	--	[illegible]	--	--	[illegible]	--	--	1.[illegible]-1.50[illegible]	--	--	1.456-1.575

* Student's "T"-test showed no significant difference between average ratios for L and LT directions.
** Regression analysis showed significant relationship with thickness. Value shown is $C_c/\sqrt{n}$

TABLE XXXV

STATISTICAL ANALYSIS OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND PLASTIC BENDING PROPERTIES OF [illegible]

[APTS (15)-7 [illegible]]

	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	Ratio, k = 1.5: [illegible]	[illegible]	[illegible]	Ratio, k = 1.5: [illegible]	[illegible]	[illegible]	Ratio, k = [illegible]: [illegible]	[illegible]	[illegible]	Ratio, k = [illegible]: [illegible]	[illegible]	[illegible]
Ratio distribution	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
n	13	13	14	12	13	11	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	5	18	13	5	18
$\bar{R}$	0.945	0.929	1.017	0.985	0.572	0.549	[illegible]	[illegible]	[illegible]	[illegible]	1.392	[illegible]	1.910	1.935	1.917	1.643	1.696	1.656
σ	0.00876**	0.01258**	0.00405	0.00731**	0.00350	0.00604	--	--	[illegible]**	--	--	0.01125**	--	--	0.00957**	--	--	0.01364**
Min $\bar{R}$	0.940–0.959	0.923–0.951	1.008	0.985–1.017	0.564	0.53[illegible]	--	--	[illegible]	--	--	1.376–1.400	--	--	1.904–1.918	--	--	1.645–1.677

* Student's "T"-test showed no significant difference between average ratios for L and LT directions.
** Regression analysis showed significant relationship with thickness. Value shown is [illegible]

TABLE XXXI

STATISTICAL ANALYSIS OF RATIOS [illegible] TENSILE, COMPRESSIVE, [illegible] BEARING PROPERTIES OF STRESS-RELIEVED [illegible] EXTRUSIONS

(AP33(6:5)-25...)

Ratio Cell	[illegible] TS(L)	[illegible] TS(L)	[illegible]* TS(L)
[illegible]	1*		1*
[illegible]	1	1	1
[illegible]	1		1
[illegible]	1		1
[illegible]	1		1
[illegible]	2		2
n	6	1	7
$\bar{x}$	[illegible]	1.850	1.831
$\hat{\sigma}$	--	--	0.00736
Min $\bar{x}$	--	--	1.813

Ratio Cell	[illegible] TYS(L)	[illegible] TYS(L)	[illegible]* TYS(L)
1.62		1	1
1.61			
1.60	1		1
1.59	1		1
1.58			
1.57			
1.56			
1.55	1		1
1.54	1		1
1.53			
1.52			
1.51			
1.50	2		2
1.49			
1.48			
1.47			
1.46			
1.45			
1.44			
1.43			
1.42	1		1
n	7	1	6
$\bar{x}$	1.529	1.620	1.540
$\hat{\sigma}$			0.01440**
Min $\bar{x}$			1.390-1.538

* [illegible]
** [illegible]
* [illegible]

TABLE XXXVII

STATISTICAL ANALYSES OF RATIOS AMONG TENSILE, COMPRESSIVE, SHEAR AND FLATWISE BEARING PROPERTIES OF STRESS-RELIEVED STRETCHED 7178-T6510 EXTRUSIONS

[AF33(615)-3580]

Ratio Cell	TUS(LT)/TUS(L)	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)
1.08				1
1.07				
1.06			1	1
1.05				
1.04				1
1.03			1	2
1.02	1	1	2	3
1.01			1	1
1.00	1		3	
0.99	2	1	2	
0.98	1		2	
0.97	1	1	3	2
0.96	2	2		
0.95	1	2	1	1
0.94	1	1		
0.93		1		
0.92		1		
0.91				
0.90	3	1		
0.89				
0.88		2		
0.87				
0.86		1		
0.85				
0.84	1			
0.83	1			
0.80				
0.81		1		
n	15	15	16	12
R	0.949	0.928	0.996	1.017
R	0.00901**	0.01019**	0.00684	0.00577**
Min R	0.862-0.957	0.830-0.927	0.981	0.941-1.026

Ratio Cell	SU(L)/TUS(L)	SU(LT)/TUS(L)
0.57	1	
0.56	1	
0.55	2	1
0.54	3	1
0.53	1	
0.52		1
0.51		2
0.50		1
n	8	6
R	0.548	0.522
R	0.00461	0.00795
Min R	0.537	0.502

e/D=1.5

Ratio Cell	BUS(L)/TUS(L)	BUS(LT)/TUS(L)	BUS (L+LT)/TUS(L)*	BYS(L)/TYS(L)	BYS(LT)/TYS(L)	BYS (L+LT)/TYS(L)*
1.52		1	1			
1.51						
1.50	3		3			
1.49						
1.48						
1.47						
1.46	2		2			
1.45						
1.44	2	2	4			
1.43						
1.42	2		2		1	1
1.41	2		2			
1.40	2		2	1		1
1.39	2		2			
1.38				1		1
1.37	1		1			
1.36		2	2	3		3
1.35					1	1
1.34				1		1
1.33					1	1
1.32				3		3
1.31				2		2
1.30					1	1
1.29				1		1
1.28				3		3
1.27					1	1
1.26				1		1
n	16	5	21	16	5	21
R	1.432	1.424	1.430	1.323	1.334	1.326
R	--	--	0.00894**	--	--	.0048
Min R	--	--	1.364-1.429	--	--	[illegible]

e/D=2.0

Ratio Cell	BUS(L)/TUS(L)	BUS(LT)/TUS(L)	BUS (L+LT)/TUS(L)*
1.92	1		1
1.91			
1.90			
1.89			
1.88	1		1
1.87	1		1
1.86			
1.85			
1.84	1		1
1.83			
1.82			
1.81			
1.80			
1.79	3		3
1.78		1	1
1.77	4		4
1.76	3	2	5
1.75	2		2
1.74			
1.73		1	1
1.72			
1.71			
1.70			
1.69		1	1
n	16	5	21
R	1.796	1.700	1.784
R	--	--	0.00988**
Min R	--	--	1.708-1.784

Ratio Cell	BYS(L)/TYS(L)	BYS(LT)/TYS(L)	BYS (L+LT)/TYS(L)*
1.70		1	1
1.69			
1.68			
1.67			
1.66	1	1	2
1.65			
1.64			
1.63			
1.62	1		1
1.61	2	1	3
1.60			
1.59			
1.58	1		1
1.57			
1.56			
1.55	2		2
1.54	1	1	2
1.53	2		2
1.52	2		2
1.51			
1.50	3		3
1.49			
1.48			
1.47			
1.46			
1.45			
1.44			
1.43		1	1
1.42			
1.41			
1.40	1		1
n	16	5	21
R	1.545	1.588	1.555
R	--	--	0.01616
Min R	--	--	1.521

* Student's "t"-test showed no significant difference between average ratios for L and LT directions.

** Regression analysis showed significant relationship with thickness. Value shown is $\sigma_e/\sqrt{n}$.

TABLE XXXVIII

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2014-T651X EXTRUSIONS

Ratio	Thickness, in. ≤0.499	0.500-0.749	0.750-1.750
$F_{tu}(LT)/F_{tu}(L)$	1.005	0.900	0.900
$F_{ty}(LT)/F_{ty}(L)$	0.930	0.869	0.869
$F_{cy}(L)/F_{ty}(L)$	0.983	0.983	0.983
$F_{cy}(LT)/F_{ty}(L)$	*	0.910	0.910
$F_{su}/F_{tu}(L)$	0.687	0.545	0.545
$F_{bru}/F_{tu}(L)$			
e/D=1.5	1.551	1.411	1.411
e/D=2.0	2.043	1.798	1.798
$F_{bry}/F_{ty}(L)$			
e/D=1.5	1.403	1.265	1.265
e/D=2.0	1.642	1.473	1.473

*Insufficient data for determining ratio

TABLE XXXIX

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES
OF STRESS-RELIEVED STRETCHED 2024-T3510 AND -T3511 EXTRUSIONS

Ratio	Thickness, in.					
	=0.249	0.250-0.499	0.500-0.749	0.750-1.499	1.500-2.999	3.000-4.499
$F_{tu}(LT)/F_{tu}(L)$	0.956	0.927	0.900	0.854	0.785	0.766
$F_{ty}(LT)/F_{ty}(L)$	0.878	0.857	0.838	0.805	0.758	0.753
$F_{cy}(L)/F_{ty}(L)$	0.816	0.836	0.854	0.887	0.935	0.947
$F_{cy}(LT)/F_{ty}(L)$	0.968	0.941	0.917	0.874	0.811	0.796
$F_{su}/F_{tu}(L)$	0.514	0.511	0.508	0.501	0.487	0.468
$F_{bru}/F_{tu}(L)$						
e/D=1.5	1.469	1.301	1.296	1.286	1.263	1.232
e/D=2.0	1.795	1.627	1.621	1.611	1.588	1.558
$F_{bry}/F_{ty}(L)$						
e/D=1.5	1.441	1.251	1.247	1.239	1.221	1.196
e/D=2.0	1.686	1.520	1.514	1.503	1.477	1.443

TABLE XL

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T8510 AND -T8511 EXTRUSIONS

Ratio	Thickness, in. 0.050-0.249	0.250-1.499	1.500-4.500
$F_{tu}(LT)/F_{tu}(L$	[illegible]5*	0.968	0.950
$F_{ty}(LT)/F_{ty}(L)$	[illegible].989	0.989	0.989
$F_{cy}(L)/F_{ty}(L)$	1.012	1.012	1.012
$F_{cy}(LT)/F_{ty}(L)$	1.012	1.012	1.012
$F_{s[illegible]}/F_{tu}(L)$	0.542	0.542	0.542
$F_{bru}/F_{tu}($[illegible]$)$			
e/D=1.5	1.465	1.452	1.390
e/D=2.0	1.925	1.870	1.769
$F_{bry}/F_{ty}(L)$			
e/D=1.5	1.407	1.407	1.407
e/D=2.0	1.653	1.653	1.653

* Based on two lots

TABLE XLI

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 6061-T651X EXTRUSIONS

Ratio	Thickness, in.	
	≤1.000	1.001-6.500
$F_{tu}(LT)/F_{tu}(L)$	0.969	0.858
$F_{ty}(LT)/F_{ty}(L)$	0.943	0.811
$F_{cy}(L)/F_{ty}(L)$	0.988	0.988
$F_{cy}(LT)/F_{ty}(L)$	1.000	0.871
$F_{su}/F_{tu}(L)$	0.705	0.511
$F_{bru}/F_{tu}(L)$		
e/D=1.5	1.687	1.387
e/D=2.0	2.170	1.807
$F_{bry}/F_{ty}(L)$		
e/D=1.5	1.534	1.200
e/D=2.0	1.723	1.444

TABLE XLII

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T651X EXTRUSIONS

Ratio	Thickness, in.						
	≤0.249	0.250-0.499	0.500-0.749	0.750-1.499	1.500-2.999	3.000-4.499	4.500-5.000
$F_{tu}(LT)/F_{tu}(L)$	0.974	0.958	0.942	0.914	0.866	0.831	0.828
$F_{ty}(LT)/F_{ty}(L)$	0.940	0.929	0.919	0.897	0.849	0.784	0.741
$F_{cy}(L)/F_{ty}(L)$	0.995	0.995	0.995	0.995	0.995	0.995	0.995
$F_{cy}(LT)/F_{ty}(L)$	1.024	1.013	1.002	0.980	0.930	0.864	0.820
$F_{su}/F_{tu}(L)$	0.536	0.533	0.529	0.523	0.509	0.490	0.478
$F_{bru}/F_{tu}(L)$							
e/D=1.5	1.440	1.440	1.440	1.437	1.414	1.351	1.288
d/D=2.0	1.808	1.804	1.800	1.792	1.772	1.747	1.730
$F_{bry}/F_{ty}(L)$							
e/D=1.5	1.339	1.333	1.327	1.314	1.285	1.247	1.221
e/D=2.0	1.578	1.571	1.565	1.552	1.522	1.482	1.456

TABLE XLIII

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES
OF STRESS-RELIEVED STRETCHED 7075-T7351X EXTRUSIONS

Ratio	Thickness, in.						
	≤0.249	0.250-0.499	0.500-0.749	0.750-1.499	1.500-2.999	3.000-4.499	4.500-5.000
$F_{tu}(LT)/F_{tu}(L)$	0.959	0.954	0.948	0.937	0.913	0.880	0.859
$F_{ty}(LT)/F_{ty}(L)$	0.951	0.943	0.935	0.919	0.882	0.834	0.801
$F_{cy}(L)/F_{ty}(L)$	1.008	1.008	1.008	1.008	1.008	1.008	1.008
$F_{cy}(LT)/F_{ty}(L)$	1.017	1.009	1.001	0.984	0.946	0.896	0.863
$F_{su}/F_{tu}(L)$	0.538	0.538	0.538	0.538	0.538	0.538	0.538
$F_{bru}/F_{tu}(L)$							
e/D=1.5	1.484	1.480	1.475	1.466	1.446	1.420	1.402
e/D=2.0	1.918	1.914	1.908	1.902	1.883	1.859	1.842
$F_{bry}/F_{ty}(L)$							
e/D=1.5	1.400	1.393	1.386	1.372	1.341	1.300	1.273
e/D=2.0	1.677	1.668	1.658	1.640	1.598	1.543	1.506

TABLE XLIV

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7079-T651X EXTRUSIONS

Ratio	Thickness, in.		
	≤0.249	0.250-0.499	0.500-0.749
$F_{tu}(LT)/F_{tu}(L)$	0.898	0.898	0.898
$F_{ty}(LT)/F_{ty}(L)$	0.876	0.876	0.876
$F_{cy}(L)/F_{ty}(L)$	0.989	0.989	0.989
$F_{cy}(LT)/F_{ty}(L)$	0.950	0.950	0.950
$F_{su}/F_{tu}(L)$	0.527	0.527	0.527
$F_{bru}/F_{tu}(L)$			
e/D=1.5	1.435	1.435	1.435
e/D=2.0	1.813	1.813	1.813
$F_{bry}/F_{ty}(L)$			
e/D=1.5	1.349	1.281	1.212
e/D=2.0	1.538	1.464	1.390

TABLE XLV

RATIOS FOR COMPUTING DESIGN MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7178-T651X EXTRUSIONS

Ratio	Thickness, in. 0.062-0.249	0.250-0.499	0.500-0.749	0.750-1.499	1.500-2.499
$F_{tu}(LT)/F_{tu}(L)$	0.957	0.945	0.933	0.907	0.862
$F_{ty}(LT)/F_{ty}(L)$	0.937	0.924	0.909	0.880	0.830
$F_{cy}(L)/F_{ty}(L)$	0.981	0.981	0.981	0.981	0.981
$F_{cy}(LT)/F_{ty}(L)$	1.026	1.016	1.005	0.982	0.941
$F_{su}/F_{tu}(L)$	0.502	0.502	0.502	0.502	0.502
$F_{bru}/F_{tu}(L)$					
e/D=1.5	1.429	1.421	1.413	1.395	1.364
e/D=2.0	1.784	1.775	1.765	1.744	1.708
$F_{bry}/F_{ty}(L)$					
e/D=1.5	1.306	1.306	1.306	1.306	1.306
e/D=2.0	1.521	1.521	1.521	1.521	1.521

TABLE XLVI

Computed Design Mechanical Properties of 2014-T651X Aluminum Alloy Extrusions

Alloy	2014							
Form	Extrusions							
Condition	T6510 and T6511							
Cross-Sectional Area, in.^{2}	All				≤25			
Thickness, in.	≤0.499		0.500-0.749		0.750-1.499		1.500-1.750	
Basis	A	B	A	B	A	B	A	B
Mechanical Properties:								
F_{tu}, ksi								
L	60	62	64	68	68	70	68	71
LT	60	62	58(-6)	61(-6)	61(-2)	63(-2)	61	64(+1)
F_{ty}, ksi								
L	53	57	58	62	60	63	60	63
LT	49(-4)	53(-4)	50(-5)	54(-5)	52(-2)	55(-2)	52	55
F_{cy}, ksi								
L	52(-3)	56(-3)	57(-3)	61(-3)	59(-3)	62(-3)	59(-3)	62(-3)
LT	*	*	53(-5)	56(-6)	55(-2)	57(-3)	55(-2)	57(-4)
F_{su}, ksi	41(+6)	43(+7)	35(-2)	37(-2)	37(-2)	38(-2)	37(-2)	39(-2)
F_{bru}, ksi								
e/D=1.5	93(+3)	96(+3)	90(-6)	96(-6)	96(+8)	99(+8)	96(+8)	100(+8)
e/D=2.0	123(+9)	127(+9)	115(-7)	122(-7)	122(+13)	126(+14)	122(+13)	128(+14)
F_{bry}, ksi								
e/D=1.5	74	80	73(-8)	78(-9)	76(-2)	80(-2)	76(-2)	80(-2)
e/D=2.0	87(+2)	94(+3)	85(-8)	91(-8)	88(+4)	93(+5)	88(+4)	93(+5)
e, percent:								
L	7	--	7	--	7	--	7	--
LT	5	--	5	--	2	--	2	--
E, 10^5 psi	10.8 (+0.3)							
E_c, 10^6 spi	11.0 (+0.3)							
G, 10^6 psi	4.1 (+0.1)							

* Insufficient data for determining value. MIL-HDBK-5 "A" value is 53; "B" value is 57.

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1966

TABLE XLVII

Computed Design Mechanical Properties of 2024-T351X Aluminum Alloy Extrusions

Alloy	2024															
Form.	Extrusions															
Condition	T3510 and T3511															
Cross-Sectional Area, in.^{2} . .	All								≤25						[illegible]	
Thickness, in.	≤0.249		0.250-0.499		0.500-0.749		0.750-1.499		1.500-2.999		3.000-4.499		1.500-2.999	3.000-4.499
Basis	A	B	A	B	A	B	A	B	A	B	A	B	S	S
Mechanical Properties:														
F_{tu}, ksi														
L	57	61	60	62	60	62	65	70	70	74	70	74	6[illegible]	6[illegible]
LT.	54(-3)	58(-3)	56(-4)	57(-5)	54(-6)	56(-6)	56(-2)	60(-1)	55(+1)	58(+1)	54(+4)	57(+4)	53(•)	52(•)
F_{ty}, ksi														
L	42	47	44	47	44	47	46	54	52	54	52	54	4[illegible]	4[illegible]
LT.	37(-5)	41(-5)	38(-5)	40(-6)	37(-5)	39(-6)	37(-4)	43(-1)	39(+1)	41	39(+3)	41(+2)	36(•)	3[illegible](•)
F_{cy}, ksi														
L	34(-4)	38(-3)	37(-2)	39(-3)	38(-1)	40(-2)	41(-3)	48(-4)	49(-1)	50(-2)	49(-1)	51(-1)	45(•)	4[illegible](•)
LT.	41(+3)	45(+4)	41(+2)	44(+2)	40(+1)	43(+1)	40(-2)	47(-1)	4[illegible]	44	4[illegible](-1)	43(-1)	39(•)	3[illegible](•)
F_{su}, ksi	29(-1)	31(-1)	31(-1)	32(-1)	30(-2)	31(-2)	33(-1)	35(-3)	34(-4)	36(-4)	33(-5)	35(-5)	33(•)	3[illegible](•)
F_{bru}, ksi														
e/D=1.5	84(-1)	90(-1)	78(-7)	81(-10)	78(-7)	80(-11)	84(-1)	90(-1)	88(+3)	93(+2)	86(+1)	91	86(•)	84(•)
e/D=2.0	102(-6)	109(-5)	98(-10)	101(-13)	97(-11)	101(-13)	105(-3)	113(-1)	111(+3)	113(+4)	109(+1)	115(+1)	103(•)	106(•)
F_{bry}, ksi														
e/D=1.5	61(+2)	68(+2)	55(-5)	59(-7)	55(-5)	59(-7)	57(-4)	67(+1)	63(+1)	66	62	65(-1)	59(•)	57(•)
e/D=2.0	71(+4)	79(+4)	67(-2)	71(-4)	67(-2)	71(-4)	69(-2)	81(+6)	77(+4)	80(+5)	75(+2)	78(+3)	71(•)	69(•)
e, percent:														
L	12	--	12	--	12	--	10	--	10	--	10	--	8	6
LT.	--	--	6[a]	--	6	--	5	--	2	--	[illegible]	--	--	--
E, 10^6 psi	10.8(+0.3)													
E_c, 10^6 psi	11.0(+0.3)													
G, 10^6 psi	4.1(+0.1)													

[a]Not applicable to sections less than 3/8 in. in thickness

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1966

• No values shown in MIL-HDBK-5, November 1966

TABLE XLVIII

Computed Design Mechanical Properties of 2024-T851X Aluminum Alloy Extrusions

Alloy	2024		
Form.	Extrusions		
Condition	T8510 and T8511		
Cross-Sectional Area, in.^{2} .	All		≤32
Thickness, in.	0.050-0.249	0.250-1.499	1.500-4.500
Basis	S	S	S
Mechanical Properties:			
F_{tu}, ksi			
L	64	66	66
LT.	60(*)	64(*)	63(*)
F_{ty}, ksi			
L	56	58	58
LT.	55(*)	57(*)	57(*)
F_{cy}, ksi			
L	57(*)	59(*)	59(*)
LT.	57(*)	59(*)	59(*)
F_{su}, ksi	35(*)	36(*)	36(*)
F_{bru}, ksi			
e/D=1.5	94(*)	96(*)	92(*)
e/D=2.0	123(*)	123(*)	117(*)
F_{bry}, ksi			
e/D=1.5	79(*)	82(*)	82(*)
e/D=2.0	93(*)	96(*)	96(*)
e, percent:			
L	4	5	5
LT.	--	--	--
E, 10^6 psi	10.8 (+0.3)		
E_c, 10^6 psi	11.0 (+0.3)		
G, 10^6 psi	4.1 (+0.1)		

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1966

* No values shown in MIL-HDBK-5, November 1966

TABLE XLIX

Computed Design Mechanical Properties of 6061-T651X Aluminum Alloy Extrusions

Alloy	6061									
Form	Extrusions									
Condition	T6510 and T6511									
Cross-Sectional Area, in.^{2}	All									
Thickness, in.	≤0.249		0.250-0.499		0.500-1.000		1.001-2.999		3.000-6.500	
Basis	A	B	A	B	A	B	A	B	A	B
Mechanical Properties:		*		*		*		*		*
F_{tu}, ksi										
L	38	41	38	41	38	41	38	41	38	41
LT	37(+1)	40	37(+1)	40	37(+1)	40	33(-3)	35	33(-3)	35
F_{ty}, ksi										
L	35	38	35	38	35	38	35	38	35	38
LT	33	36	33	36	33	36	28(-5)	31	28(-5)	31
F_{cy}, ksi										
L	35(+1)	38	35(+1)	38	35(+1)	38	35(+1)	38	35(+1)	38
LT	35	38	35	38	35	38	30(-5)	33	30(-5)	33
F_{su}, ksi	27(+3)	29	27(+3)	29	27(+3)	29	19(-5)	21	19(-5)	21
F_{bru}, ksi										
e/D=1.5	64(+3)	69	64(+3)	69	64(+3)	69	49(-11)	68	49(-11)	68
e/D=2.0	82(+2)	89	82(+2)	89	82(+2)	89	69(-11)	74	69(-11)	74
F_{bry}, ksi										
e/D=1.5	54(+5)	58	54(+5)	58	54(+5)	58	42(-7)	46	42(-7)	46
e/D=2.0	60(+4)	65	60(+4)	65	60(+4)	65	51(-5)	55	51(-5)	55
e, percent:										
L	8(-2)	--	10	--	10	--	10	--	10	--
LT	--	--	--	--	--	--	--	--	--	--
E, 10^6 psi	9.7(-0.2)				9.9†				10.3(+0.4)	
E_c, 10^6 psi	9.9(-0.2)				10.1†				10.6(+0.5)	
G, 10^6 psi	3.7(-0.1)				3.8†				3.9(+0.1)	

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, February 1966

* "B" values not shown in MIL-HDBK-5, February 1966

† No tests made in these thickness ranges. Values as presented in MIL-HDBK-5, February 1966

TABLE L

Computed Design Mechanical Properties of 7075-T651X Aluminum Alloy Extrusions

Alloy	7075														
Form	Extrusions														
Condition	T6510 and T6511														
Cross-Sectional Area, in.^{2}	≤20										≤20		>20, ≤32	≤32	
Thickness, in.	≤0.249		0.250-0.499		0.500-0.749		0.750-1.499		1.500-2.999		3.000-4.499		3.000-4.499	4.500-5.000	
Basis	A	B	A	B	A	B	A	B	A	B	A	B	S	A	B
Mechanical Properties:															
F_{tu}, ksi															
L	78	82	81	85	81	85	81	85	81	85	81	84	78	78	81
LT	76	80(+2)	78(+1)	81(+2)	76(+3)	80(+5)	74(+2)	78(+4)	70(+4)	74(+6)	67(+1)	70(+2)	65	65(+1)	67(+1)
F_{ty}, ksi															
L	70	74	73	77	72	76	72	76	72	76	71	74	70	68	71
LT	66(+2)	70(+3)	68(+2)	72(+4)	66(+3)	70(+4)	65(+3)	68(+4)	61(+4)	65(+6)	56	58	55	50(-4)	53(-3)
F_{cy}, ksi															
L	70(-1)	74(-1)	73(-1)	77(-1)	72	76	72(+1)	76(+1)	72(+2)	76(+3)	71(+5)	74(+5)	70(+4)	68(+3)	71(+3)
LT	72(+1)	70(+1)	74	78	72(-1)	76(-1)	71(-1)	74(-1)	67(-2)	71(-1)	61(-4)	64(-4)	60(*)	56(*)	58(*)
F_{su}, ksi	42(-1)	44(-1)	43(-2)	45(-2)	43(-2)	45(-2)	42(-3)	44(-3)	41(-4)	43(-4)	40(-5)	41(-5)	38(-5)	37(-6)	39(-5)
F_{bru}, ksi															
e/D=1.5	112(+11)	118(+11)	117(+20)	122(+20)	117(+20)	122(+20)	116(+19)	122(+20)	115(+18)	120(+ 8)	109(+12)	113(+12)	105(+11)	100(+6)	104(+7)
e/D=2.0	141(+16)	148(+17)	146(+16)	153(+17)	146(+16)	153(+17)	145(+15)	152(+16)	144(+14)	151(+15)	142(+20)	147(+21)	136(+19)	135(+18)	140(+15)
F_{try}, ksi															
e/D=1.5	94(+3)	99(+3)	97(+17)	103(+18)	96(+17)	101(+17)	95(+16)	100(+16)	93(+14)	98(+14)	89(+11)	92(+11)	87(+10)	83(+8)	87(+9)
e/D=2.0	110(+12)	117(+13)	115(+13)	121(+13)	113(+12)	119(+13)	112(+11)	118(+12)	110(+9)	116(+10)	105(+13)	110(+14)	104(+13)	99(+11)	103(+11)
e, percent:															
L	7	8	7	8	7	8	7	8	7	8	7	8	6	6	--
LT	5	--	5	--	4	--	3	--	1	--	1	--	1	1	--
E, 10^6 psi	10.4(+0.1)														
E_c, 10^6 psi	10.7(+0.2)														
G, 10^6 psi	4.0(+0.1)														

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1967.

* No values shown in MIL-HDBK-5, November 1967.

TABLE LI

Computed Design Mechanical Properties of 7075-T7351X Aluminum Alloy Extrusions

Alloy	7075			
Form	Extrusions			
Condition	T73510 and T73511			
Cross-Sectional Area, in.^{2}	All			
Thickness, in.	≥0.249	0.250-0.499	0.500-0.749	0.750-1.499
Basis	S	S	S	S
Mechanical Properties:				
F_{tu}, ksi				
L	66	69	70	70
LT	63 (-3)	66	66	66
F_{ty}, ksi				
L	58	61	61	61
LT	55 (-3)	58	57 (+2)	56 (+1)
F_{cy}, ksi				
L	58	61 (+1)	61	61
LT	59 (-1)	62 (+2)	61 (+2)	60 (+1)
F_{su}, ksi	36 (-1)	37 (-2)	38 (-1)	38 (-1)
F_{bru}, ksi				
e/D=1.5	98 (-3)	102 (-1)	103 (-1)	103 (-1)
e/D=2.0	127 (-1)	132 (+1)	134 (+2)	133 (+1)
F_{bry}, ksi				
e/D=1.5	81 (-5)	85 (-4)	85 (-2)	84 (-3)
e/D=2.0	97 (-4)	102 (-2)	101 (-1)	100 (-2)
e, per cent:				
L	7	7	7	7
LT	--	--	--	--
E, 10^6 psi	10.4 (+0.1)			
E_c, 10^6 psi	10.7 (+0.1)			
G, 10^6 psi	4.0 (+0.1)			

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1967

TABLE LII

Computed Design Mechanical Properties of 7079-T651X Aluminum Alloy Extrusions

Alloy	7079		
Form	Extrusions		
Condition	T6510 and T6511		
Cross-Sectional Area, in.^{2}	≤20		
Thickness, in.	≤0.249	0.250-0.499	0.500-0.749
Basis	S	S	S
Mechanical Properties:			
F_{tu}, ksi			
L	75	77	78
LT	67(-6)	69(-4)	70(-2)
F_{ty}, ksi			
L	67	68	70
LT	59(-6)	60(-5)	61(-3)
F_{cy}, ksi			
L	66(-1)	67(-1)	69(-1)
LT	64(-3)	65(-2)	67
F_{su}, ksi	40(-1)	41(-1)	41(-2)
F_{bru}, ksi			
e/D=1.5	108(+18)	110(+18)	112(+18)
e/D=2.0	136(+16)	140(+17)	141(+16)
F_{bry}, ksi			
e/D=1.5	90(+16)	87(+12)	85(+8)
e/D=2.0	103(+9)	100(+5)	97(-1)
e, per cent:			
L	7	7	7
LT	6	6	5
E, 10^6 psi	10.4 (+0.1)		
E_c, 10^6 psi	10.7 (+0.2)		
G, 10^6 psi	4.0 (+0.1)		

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1966

TABLE LIII

Computed Design Mechanical Properties of 7178-T651X Aluminum Alloy Extrusions

Alloy	7178								
Form	Extrusions								
Condition	T6510 and T6511								
Cross-Sectional Area, in.^{2}	≤20		≤25						
Thickness, in.	0.062-0.249		0.250-0.499		0.500-0.749		0.750-1.499		1.500-2.499
Basis	A	B	A	B	A	B	A	B	S
Mechanical Properties:									
F_{tu}, ksi									
L	84	88	87	90	87	90	87	90	86
LT	80(-1)	84(-1)	82(+2)	85(+2)	81(+2)	84(+2)	79(+2)	82(+2)	74(+4)
F_{ty}, ksi									
L	76	80	78	81	78	81	78	81	77
LT	71	75	72(+3)	75(+3)	71(+3)	74(+3)	69(+3)	7[illegible](+2)	64([illegible])
F_{cy}, ksi									
L	75(-1)	78(-2)	77(-1)	79(-2)	77(-1)	79(-2)	77(-1)	79(-2)	76(-1)
LT	78(+2)	82(+2)	79(+9)	82(+9)	78(+8)	8[illegible](+8)	77(+7)	80(+7)	72(+3)
F_{su}, ksi	42(-3)	44(-3)	44(-3)	45(-4)	44(-3)	45(-4)	44(-3)	45(-4)	43(-3)
F_{bru}, ksi									
e/D=1.5	120(+11)	126(+12)	124(+20)	128(+20)	123(+19)	127(+19)	121(+17)	126(+18)	117(+14)
e/D=2.0	150(+16)	157(+16)	154(+15)	160(+16)	154(+15)	159(+15)	152(+13)	157(+13)	147(+9)
F_{bry}, ksi									
e/D=1.5	99	104	102(+16)	106(+17)	102(+16)	106(+17)	102(+16)	106(+17)	101(+16)
e/D=2.0	116(+10)	122(+10)	119(+10)	123(+10)	119(+10)	123(+10)	119(+10)	123(+10)	117(+9)
e, percent									
L	5	--	5	--	5	--	5	--	5
LT	--	--	--	--	--	--	--	--	--
E, 10^6 psi	10.4(-0.1)								
E_c, 10^6 psi	10.7								
G, 10^6 psi	4.0								

NOTE: Numbers in parenthesis are differences from values in MIL-HDBK-5, November 1967.

TABLE LIV

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 2014 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT)/TUS(L)	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	SS(L&LT)/TS(L)	BUS(L OR LT)/TUS(L) e/D=1.5	BUS(L OR LT)/TUS(L) e/D=2.0	BYS(L OR LT)/TYS(L) e/D=1.5	BYS(L OR LT)/TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T6510	≤0.499	6	1.005	0.930	0.983	‡	0.687	1.551	2.046	1.403	1.642
	0.500-0.749	3	0.900	0.869	0.983	0.910	0.545	1.411	1.798	1.265	1.473
	0.750-1.499	1	0.900	0.869	0.983	0.910	0.545	1.411	1.798	1.265	1.473
	1.500-1.750	2	0.900	0.869	0.983	0.910	0.545	1.411	1.798	1.265	1.473
			Ratios from Present MIL-HDBK-5 Values*								
T6, T6510, T6511	0.125-0.499	--	1.00	1.00	1.04	1.00	0.58	1.50	1.90	1.40	1.60
	0.500-0.749	--	1.00	0.95	1.03†	1.00	0.58	1.50	1.91	1.40	1.60
	0.750-1.499	--	0.93	0.90	1.03†	0.95	0.57	1.29	1.60	1.30	1.40
	1.500-2.999	--	0.90	0.87	1.03†	0.95	0.57	1.29	1.60	1.30	1.40
			Average Ratios [AF33(615)-3580]								
T52	≤0.499	3	1.01	0.98	1.05	1.07	0.59	1.55	1.99	1.46	1.73
	3.250	1	0.90	0.90	1.04	0.94	0.56	1.44	1.83	1.32	1.60
			Ratios from Present MIL-HDBK-5 Values*								
T62	0.125-4.499	--	0.93	0.89	1.00	0.91	0.58	--	--	--	--

* MIL-HDBK-5, February 1966
† For T6510 and T6511 tempers, ratio may be lower
‡ Insufficient data to determine ratio

TABLE LV

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 2024 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT) / TUS(L)	TYS(LT) / TYS(L)	CYS(L) / TYS(L)	CYS(LT) / TYS(L)	SS(L&LT) / TUS(L)	BUS(L or LT) / TUS(L), e/D=1.5	BUS(L or LT) / TUS(L), e/D=2.0	BYS(L or LT) / TYS(L), e/D=1.5	BYS(L or LT) / TYS(L), e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T3510, T3511	≂0.249	6	0.956	0.878	0.816	0.968	0.514	1.469	1.795	1.441	1.686
	0.250-0.499	3	0.927	0.857	0.836	0.941	0.511	1.301	1.627	1.251	1.520
	0.500-0.749	4	0.900	0.838	0.854	0.917	0.508	1.296	1.621	1.247	1.514
	0.750-1.499	5	0.854	0.805	0.887	0.874	0.501	1.286	1.611	1.239	1.503
	1.500-2.999	3	0.785	0.758	0.935	0.811	0.487	1.263	1.588	1.221	1.477
	3.000-4.499	2	0.766	0.753	0.947	0.796	0.468	1.232	1.558	1.195	1.443
			Ratios from Present MIL-HDBK-5 Values*								
T4, T3510, T3511	0.050-0.249	--	1.00	1.00	0.90	0.90	0.53	1.49	1.89	1.40	1.60
	0.250-0.499	--	1.00	0.98	0.89	0.89	0.53	1.42	1.80	1.36	1.57
	0.500-0.749	--	1.00	0.95	0.89†	0.89	0.53	1.42	1.80	1.36	1.57
	0.750-1.499	--	0.89	0.89	0.96†	0.91	0.52	1.31	1.66	1.33	1.54
	1.500-2.999	--	0.77	0.73	0.96†	0.81	0.54	1.21	1.54	1.19	1.40
	3.000-4.499	--	0.71	0.69	0.96†	0.81	0.54	1.21	1.54	1.19	1.40
			Average Ratios [AF33(615)-3580]								
T42	0.050-0.249	2	1.02	1.00	1.04	1.06	--	1.54	1.86	1.74	2.03
	0.250-0.499	2	0.95	0.93	1.02	1.05	0.51	1.37	1.67	1.40	1.72
	1.500-2.999	1	0.75	0.78	1.00	0.81	0.50	1.30	1.64	1.30	1.54
			Ratios from Present MIL-HDBK-5 Values*								
T42	All	--	0.88	0.95	1.00	1.00	0.53	1.49	1.89	1.39	1.61
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T8510, T8511	0.050-0.249	6	0.933‡	0.989	1.012	1.012	0.542	1.465	1.925	1.407	1.653
	0.250-1.499	12	0.968	0.989	1.012	1.012	0.542	1.452	1.870	1.407	1.653
	1.500-4.500	5	0.950	0.989	1.012	1.012	0.542	1.390	1.769	1.407	1.653
			Average Ratios [AF33(615)-3580]								
T62	0.050-0.249	2	1.04	1.00	1.03	1.04	--	1.64	2.02	1.63	1.94
	0.250-0.499	2	0.97	0.99	1.06	1.06	0.56	1.46	1.89	1.40	1.70
	1.500-2.999	1	0.87	0.89	1.02	0.92	0.54	1.42	1.85	1.43	1.75

*MIL-HDBK-5, November 1966
†For T3510 and T3511 tempers, ratio may be lower
‡Based on two lots.

TABLE LVI

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 6061 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness, Range, in.	Number of Samples	TUS(LT) / TUS(L)	TYS(LT) / TYS(L)	CYS(L) / TYS(L)	CYS(LT) / TYS(L)	SS(L&LT) / TUS(L)	BUS(L or LT) / TUS(L) e/D=1.5	BUS(L or LT) / TUS(L) e/D=2.0	BYS(L or LT) / TYS(L) e/D=1.5	BYS(L or LT) / TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T6510	≤1.000	14	0.969	0.943	0.988	1.000	0.705	1.687	2.170	1.534	1.723
	1.001-3.500	5	0.858	0.811	0.988	0.871	0.511	1.387	1.807	1.200	1.444
			Ratios from Present MIL-HDBK-5 Values*								
T6, T6510 T6511	≤3.000	--	0.95	0.94	0.97	1.00	0.63	1.61	2.11	1.40	1.60
			Average Ratios [AF33(615)-3580]								
T62	≤1.000	2	0.95	0.93	1.02	0.99	0.74	1.67	2.18	1.58	1.80
	1.001-2.000	1	0.99	0.98	1.03	1.05	0.69	1.65	2.13	1.64	1.89

* MIL-HDBK-5, February 1966

TABLE LVII

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 7075 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT)/TUS(L)	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	SS(L&LT)/TUS(L)	BUS(L or LT)/TUS(L) e/D=1.5	BUS(L or LT)/TUS(L) e/D=2.0	BYS(L or LT)/TYS(L) e/D=1.5	BYS(L or LT)/TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T6510	$\leq$0.249	7	0.974	0.940	0.995	1.024	0.536	1.440	1.808	1.339	1.578
	0.250-0.499	6	0.958	0.929	0.995	1.013	0.533	1.440	1.804	1.333	1.571
	0.500-0.749	0	0.942	0.919	0.995	1.002	0.529	1.440	1.800	1.327	1.565
	0.750-1.499	4	0.914	0.897	0.995	0.980	0.523	1.437	1.792	1.314	1.552
	1.500-2.999	5	0.866	0.849	0.995	0.930	0.509	1.414	1.772	1.285	1.522
	3.000-4.499	2	0.831	0.784	0.995	0.864	0.490	1.351	1.747	1.247	1.482
	4.500-5.000	1	0.828	0.741	0.995	0.820	0.478	1.288	1.730	1.221	1.456
			Ratios from Present MIL-HDBK-5 Values*								
T6, T6510, T6511	$\leq$0.249	--	0.97	0.91	1.01	1.01	0.55	1.29	1.60	1.30	1.40
	0.250-0.499	--	0.95	0.90	1.01	1.01	0.56	1.20	1.60	1.10	1.40
	0.500-0.749	--	0.90	0.88	1.00	1.01‡	0.56	1.20	1.60	1.10	1.40
	0.750-1.499	--	0.89	0.86	0.99	1.00‡	0.56	1.20	1.60	1.10	1.40
	1.500-2.999	--	0.81	0.79	0.97	0.96‡	0.56	1.20	1.60	1.10	1.40
	3.000-4.999	--	0.81	0.79	0.93	0.92‡	0.56	1.20	1.51	1.10	1.30
	4.500-5.000	--	0.82	0.79	0.96	--	0.55	1.20	1.50	1.10	1.29
			Average Ratios [AF33(615)-3580]								
T62	$\leq$0.249	2	0.98	0.99	1.06	1.09	--	1.46	1.89	1.37	1.68
	0.250-0.499	1	0.93	0.93	1.05	1.03	0.53	1.36	1.74	1.31	1.54
	0.750-1.499	1	0.92	0.92	1.05	0.99	0.54	1.42	1.75	1.39	1.61
	1.500-2.999	2	0.84	0.81	1.03	0.88	0.52	1.36	1.68	1.26	1.49

TABLE LVII (Concl.)

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 7075 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT)/TUS(L)	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	SS(L&LT)/TUS(L)	BUS(L or LT)/TUS(L) e/D=1.5	BUS(L or LT)/TUS(L) e/D=2.0	BYS(L or LT)/TYS(L) e/D=1.5	BYS(L or LT)/TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios AF33(615)-3580								
T73510	0.249	2	0.959	0.951	1.008	1.017	0.538	1.484	1.918	1.400	1.677
	0.250-0.499	4	0.954	0.943	1.008	1.009	0.538	1.480	1.914	1.393	1.668
	0.500-0.749	0	0.948	0.935	1.008	1.0[illegible]1	0.538	1.475	1.908	1.386	1.653
	0.750-1.499	3	0.937	0.919	1.008	0.984	0.538	1.466	1.902	1.372	1.640
	1.500-2.999	4	0.913	0.882	1.008	0.946	0.538	1.446	1.883	1.341	1.598
	3.000-4.499	1	0.880	0.834	1.008	0.896	0.538	1.420	1.859	1.300	1.543
	4.500-5.000	1	0.859	0.801	1.008	0.863	0.538	1.402	1.842	1.273	1.536
			Ratio from Present MIL-HDBK-5 Values*								
T73510, T73511	0.062-0.249	--	1.00	1.00	1.00	1.04	0.56	1.53	1.94	1.48	1.74
	0.250-0.499	--	0.96	0.95	0.98	1.00	0.57	1.49	1.90	1.46	1.70
	0.500-1.499	--	0.94	0.90	1.00	0.97	0.57	1.49	1.89	1.43	1.67
			Average Ratios AF33(615)-3580								
T73‡	0.249	2	0.99	0.96	1.00	1.06	--	1.50	1.95	1.42	1.74
	0.250-0.499	1	0.97	0.96	1.07	1.02	0.56	1.47	1.89	1.39	1.69
	0.750-1.499	1	0.93	0.93	1.06	0.99	0.56	1.45	1.87	1.39	1.69
	1.500-2.999	2	0.90	0.85	1.02	0.89	0.56	1.50	1.90	1.38	1.63

* MIL-HDBK-5, November 1967

† For T6 temper, ratios are higher

‡ **Temper designation not strictly correct. Suitable numbers not yet assigned.**

TABLE LVIII

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 7079 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT)/TUS(L)	TYS(LT)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	SS(L&LT)/TUS(L)	BUS(L or LT)/TUS(L) e/D=1.5	BUS(L or LT)/TUS(L) e/D=2.0	BYS(L or LT)/TYS(L) e/D=1.5	BYS(L or LT)/TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T6510	≤0.249	4	0.898	0.873	0.969	0.950	0.527	1.435	[illegible]	1.349	1.558
	0.250-0.499	1	0.898	0.873	0.969	0.950	0.527	1.435	1.813	1.261	1.434
	0.500-0.749	2	0.898	0.873	0.969	0.950	0.527	1.435	1.813	1.212	1.390
			Ratios from Present MIL-HDBK-5 Values*								
T6, T6510, T6511	≤0.249	--	0.97	0.97	1.00†	1.00	0.55	1.20	1.60	1.10	1.40
	0.250-0.499	--	0.95	0.95	1.00†	0.99	0.55	1.20	1.60	1.10	1.40
	0.500-0.749	--	0.92	0.91	1.00†	0.95	0.55	1.21	1.60	1.10	1.40
			Average Ratios [AF33(615)-3580]								
T62	≤0.249	1	0.97	0.98	1.06	0.98	0.58	1.46	1.91	1.32	1.41

* MIL-HDBK-5, November 1966
† For T6510 and T6511 tempers, ratios may be lower

TABLE LIX

SUMMARY OF RATIOS COMPUTED IN CONTRACT FOR 7178 ALUMINUM ALLOY EXTRUSIONS

Temper	Thickness Range, in.	Number of Samples	TUS(LT) / TUS(L)	TYS(LT) / TYS(L)	CYS(L) / TYS(L)	CYS(LT) / TYS(L)	SS(L&LT) / TUS(L)	BUS(L or LT) / TUS(L) e/D=1.5	BUS(L or LT) / TUS(L) e/D=2.0	BYS(L or LT) / TYS(L) e/D=1.5	BYS(L or LT) / TYS(L) e/D=2.0
			Statistically-Derived Minimum Ratios [AF33(615)-3580]								
T6510	0.032-0.249	8	0.957	0.937	0.981	1.026	0.502	1.429	1.784	1.306	1.521
	0.250-0.499	5	0.945	0.924	0.981	1.016	0.502	1.421	1.775	1.306	1.521
	0.500-0.749	1	0.935	0.909	0.981	1.005	0.502	1.413	1.765	1.306	1.521
	0.750-1.499	4	0.907	0.880	0.981	0.982	0.502	1.395	1.744	1.306	1.521
	1.500-2.499	2	0.862	0.830	0.981	0.941	0.502	1.364	1.708	1.306	1.521
			Ratios from Present MIL-HDBK-5 Values*								
T6, T6510, T6511	0.032-0.249	--	0.97	0.93	1.00†	1.00	0.54	1.30	1.60	1.30	1.39
	0.250-0.499	--	0.92	0.88	1.00†	0.90	0.54	1.20	1.60	1.10	1.40
	0.500-0.749	--	0.91	0.87	1.00†	0.90	0.54	1.20	1.60	1.10	1.40
	0.750-1.499	--	0.89	0.85	1.00†	0.90	0.54	1.20	1.60	1.10	1.40
	1.500-2.499	--	0.81	0.77	1.00†	0.90	0.54	1.20	1.60	1.10	1.40
			Average Ratios [AF33(615)-3580]								
T62	0.0[illegible]	2	0.99	0.99	1.07	--	--	1.42	1.73	1.36	1.58
	0.250-0.499	1	0.96	0.92	1.03	1.04	0.52	1.40	1.70	1.32	1.60
	1.500-2.499	1	0.92	0.89	1.04	0.98	0.53	1.37	1.72	1.28	1.52

* MIL-HDBK-5, November 1967

† For T6510 and T6511 tempers, ratio may be lower

TABLE LX

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

[AP23(615)-356C]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Direction*	Location*	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing Ultimate Stress e/D=1.5	Bearing Ultimate Stress e/D=2.0	Bearing Yield Stress e/D=1.5	Bearing Yield Stress e/D=2.0
					Stress-Relieved Stretched Extrusions								
2014-T6510	0.625	3.4	340466**	[illegible]	W/4 / W/4	[illegible]	[illegible]	0.95 0.95	0.95 --	1.01 --	1.00 --	1.01 --	0.98 --
	1.625 1.755	2.2 [illegible]	318041 340467**	[illegible]	[illegible]/[illegible] TW/4/TW/4	[illegible] -- 1.00	[illegible] -- [illegible]	1.01 1.02 -- --	1.00 0.9[illegible] -- --	0.99 1.02 1.07* --	0.98 0.96 1.02* --	0.97 1.01 1.01* --	0.97 0.98 1.02* --
2024-T3511	0.500	[illegible]	31[illegible]**	[illegible]	W/4/W/4	[illegible]	[illegible]	1.07 --	[illegible] --	-- --	-- --	-- --	-- --
	0.815	3.[illegible]	340[illegible]**	[illegible]	W/4/W/4	[illegible]	[illegible]	0.9[illegible] 1.06	1.00 --	0.99 --	0.99 --	1.00 --	0.99 --
	0.150	5.[illegible]	318077	[illegible]	W/4/W/4	[illegible]	[illegible]	0.94 0.9[illegible]	1.01 --	0.99 --	1.01 --	0.97 --	0.96 --
	1.450	7.3	315021****	[illegible]	W/4/W/4	[illegible] --	[illegible] --	0.97 --	0.9[illegible] --	0.9[illegible] 0.99*	0.96 0.97*	0.99 0.97*	0.98 0.99*
	1.706	4.5	340013	[illegible]	TW/2/TW/4	[illegible] 1.00	1.0[illegible]	1.01 1.01	0.9[illegible] --	0.98 --	0.96 --	1.00 --	0.97 --
	2.500	5.5	31[illegible]33**	[illegible]	TW/2/TW/4	[illegible] 1.00	[illegible] 1.0[illegible]	1.00 --	-- --	1.00 1.0[illegible]*	1.02 0.98*	1.00 0.97*	1.02 1.02*
	4.000	14.0	340014	[illegible]	TW/2/TW/4	[illegible] [illegible]	1.02 [illegible]	1.0[illegible] 0.95	0.95 0.9[illegible]	0.91 0.96*	0.99 0.97*	1.01 0.97*	1.01 0.99*
	2.750	34.6	315045	[illegible]	TW/2/TW/4	[illegible] 1.00	1.00 1.00	0.99 1.00	1.00 0.9[illegible]	1.07 0.96* 0.99 1.00	1.05 0.97* 0.99 0.98	1.04 1.02* 0.97 1.01	1.06 0.99* 1.00 0.98
	4.500	30.7	340[illegible]	[illegible]	TW/2/TW/4	[illegible] [illegible] -- 1.00	1.05 [illegible] -- 1.04	1.04 0.95 -- 1.02	1.01 0.90 -- 0.96	0.98* 1.03 1.02*	0.94* 1.05 1.12*	1.00* 1.00 0.97*	0.99* 0.95 0.96*
2024-T8510	0.525	1.9	31[illegible]**	[illegible]	W/2/W/4	0.95 1.00	0.95 1.0[illegible]	0.99 --	0.94 --	-- --	-- --	-- --	-- --
	1.515	3.[illegible]	340410**	[illegible]	W/2/W/4	1.01 1.01	0.99 1.01	1.00 0.99	1.00 --	0.99 --	1.01 --	1.00 --	1.01 --

TABLE LX (Continued)

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Direction*	Location†	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing: Ultimate Stress e/D=1.5	Bearing: Ultimate Stress e/D=2.0	Bearing: Yield Stress e/D=1.5	Bearing: Yield Stress e/D=2.0
2024-T8510	1.150	5.6	318078	L LT	W/2/W/4	0.98 1.00	0.98 1.00	1.00 0.98	1.00 --	0.99 --	1.00 --	0.99 --	1.00 --
	1.450	7.3	318025****	L L LT	W/2/W/4	1.00 --	1.00 --	0.99 --	1.00 --	0.99 0.99*	1.02 1.01*	0.98 1.01*	1.01 1.01*
	1.705	4.5	340169	L LT	TW/2/TW/4	1.01 1.00 0.96	1.02 1.03 1.01	1.00 1.00	-- 0.98	-- 1.01	-- 1.02	-- 1.02	-- 1.03
	2.520	8.5	340420**	L L LT	TW/2/TW/4	1.00 --	1.01 --	-- 1.00	-- 0.99	-- 0.96 0.97*	-- 1.00 0.99*	-- 0.96 0.99*	-- 1.00 0.99*
	3.760	29.6	318074	L L LT	TW/2/TW/4	0.98 1.00 --	0.98 1.00 --	-- 0.99 0.99 --	-- 1.04 1.00 --	-- 1.05 0.94*	-- 1.01 0.97*	-- *** ***‡	-- 0.96 1.03*
	4.000	24.0	340325	L L LT	TW/2/TW/4	1.01 0.98 --	1.02 0.96 --	0.99 0.98 --	1.05 0.98 --	1.02 0.96 0.94*	1.03 0.99 0.96*	0.97 0.98 0.96*	0.97 1.01 0.97*
	4.500	30.7	340259	L L LT L LT ST	TW/2/TW/4	0.98 0.97 -- 1.00 --	0.98 0.98 -- 1.01 --	0.98 0.97 -- 0.96 --	0.97 0.98 -- 0.99 --	-- 0.96 0.96* 0.99 0.96*	-- 1.00 0.95* 1.07 0.90*	-- 0.99 0.69* 0.95 0.95*	-- 0.98 1.00* 0.97 0.96*
6061-T6510	1.004	2.0	340423**	L L	W/2/W/4	0.99 --	0.99 --	1.01 --	1.01 --	1.00 1.00*	1.01 0.99*	0.99 1.01*	1.00 1.02*
	1.240 1.490	2.7 4.5	317907 340460**	L L LT	W/2/W/4 W/2/W/4	1.01 0.98 --	1.01 0.97 --	0.98 0.97 --	0.99 1.05 --	-- 0.99 0.99*	-- 0.99 0.97*	-- 1.01 0.99*	-- 1.00 1.00*
	1.960 3.000	4.4 15.0	317696 340226	L L LT	W/4/W/4 TW/2/TW/4	1.01 1.01 0.98 --	1.01 1.01 0.98 --	1.00 1.02 0.97 --	-- 0.98 1.00 --	-- 0.99 0.99 0.99*	-- 1.00 0.99 0.98*	-- 1.00 0.99 0.97*	-- 0.97 0.99 0.96*
	6.500	33.9	317697	L LT ST	D/2/D/4	0.98 0.99 0.99	1.02 0.99 0.97	0.98 0.99 0.97	0.97 0.99 0.99	-- 0.98 --	-- 0.98 --	-- 0.99 --	-- 0.95 --
7075-T6510	0.935	7.2	340155	L LT	W/2/W/4	0.98 0.99	0.97 0.96	0.97 0.98	0.99 0.96	0.99 --	0.98 --	0.97 --	0.98 --
	1.165	27.1	317560	L L LT ST	W/2/W/4	0.98 -- 0.98 --	0.95 -- 0.96 --	0.97 -- 0.99 --	0.94 -- 0.99 --	0.99 1.02* 1.00 1.03*	0.98 0.99* 1.01 1.04*	0.99 1.02* 0.99 0.98*	0.96 1.02* 0.99 0.93*

TABLE LX (Continued)

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

[AF33(615)-358C]

Alloy and Temper	Sample Section Thickness, in.	Sample Cross-Sectional Area, in.²	Sample Number	Direction*	Location†	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing Ultimate Stress e/D=1.5	Bearing Ultimate Stress e/D=2.0	Bearing Yield Stress e/D=1.5	Bearing Yield Stress e/D=2.0
7075-T6511	1.16	[illegible]	3266[illegible]	L [illegible]	W/2/W/4	1.01 -- 1.00	1.0[illegible] -- 1.00	1.01 -- 1.00	0.97 -- 0.96	0.98 1.03* 0.98 0.97*	0.99 1.07* 0.96 1.00*	0.99 1.00* 0.99 0.99*	0.99 1.01* 0.99 0.98*
	1.000 [illegible]	[illegible]	31786 31815**	[illegible]	[illegible] T/2/T/4	-- 0.96 0.97 -- 1.03	-- 0.9[illegible] 0.9[illegible] -- [illegible]	-- 0.96 0.95 -- 0.96	-- 0.97 0.96 -- 0.95	0.95 0.96 0.99* 1.00 1.03*	0.95 0.96 0.96* 1.01 1.03*	0.95 0.96 0.99* 0.99 0.98*	0.97 0.97 0.99* 0.96 0.97*
	[illegible]750	[illegible]	340[illegible]	[illegible]	T/2/T/4	-- 0.96	-- 0.96	-- 0.98	-- 0.96	0.9[illegible] 0.97*	0.99 0.9[illegible]*	0.97 0.97*	0.98 0.97*
	[illegible]	[illegible]	340[illegible]	[illegible]	T/2/T/4	-- 0.96 0.96	-- 0.96 0.9[illegible]	-- 0.98 0.97	0.96 0.95	-- 0.95 0.95*	-- 0.9[illegible] 0.9[illegible]*	-- 0.95 0.94*	-- 0.95 0.94*
	2.040	[illegible]	[illegible]***	[illegible]	T/2/T/4	-- 0.97 0.97	-- 0.97 0.97	-- 0.96 0.96	-- 0.96 --	-- 0.94 0.99*	-- 1.00 0.99*	-- 0.97 0.98*	-- 0.98 0.97*
	[illegible]	[illegible]	[illegible]	[illegible]	T/2/T/4	-- 0.99 0.98	-- 1.00 0.9[illegible]	-- 0.96 0.9[illegible]	-- 0.95	-- 0.94 0.97*	-- 0.9[illegible] 0.94*	-- 0.94 0.96*	-- 0.97 0.95*
	[illegible]	[illegible]	[illegible]	[illegible]	T/2/T/4	-- 0.96 -- 0.97 -- [illegible]	-- 0.9[illegible] -- [illegible] -- [illegible]	-- 0.96 -- 0.9[illegible] -- 0.9[illegible]	-- 0.97 -- 0.96 -- 0.96	0.95 0.94* 0.94 0.99* --	1.00 0.22* 0.9[illegible] 1.01* --	0.92 0.95* 0.96 0.98* --	0.95 0.95* 0.95 0.96* --
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.96 [illegible] 0.97	[illegible]	0.97 [illegible]	0.96 [illegible] 0.98	1.00 -- 0.96 1.02*	1.00 -- 0.9[illegible] 1.04*	1.00 -- 0.97 1.03*	0.99 -- 0.97 1.02*
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-- 0.9[illegible] 1.01 -- 1.01	-- 0.9[illegible] 1.0[illegible] -- 1.0[illegible]	-- 0.9[illegible] [illegible]	0.98 0.99 -- 0.99	-- 1.00 0.98* 1.01 0.99*	-- 1.00 0.97* 1.00 1.00*	-- 1.01 1.03* 0.98 1.01*	-- 1.00 0.97 1.01 1.01*
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-- 0.9[illegible] 0.9[illegible]	-- 0.96 [illegible]	-- 0.96 0.9[illegible]	-- 0.99 0.98	1.01 0.98 1.00*	0.96 0.97 0.9[illegible]*	1.02 0.97 0.99*	1.00 0.96 0.99*
	[illegible]	[illegible]	340[illegible]	[illegible]	T/2/T/4	-- 0.9[illegible] 0.9[illegible]	-- [illegible]	-- [illegible]	0.98 0.97 --	-- 0.97 0.96*	-- 0.97 0.99*	-- 0.97 0.98*	-- 0.99 0.99*
	[illegible]	[illegible]	[illegible]	[illegible]	T/2/T/4	-- 0.9[illegible] 0.9[illegible] -- 0.98	-- [illegible] 1.0[illegible] -- 0.9[illegible]	-- 0.9[illegible] 0.9[illegible] -- 0.9[illegible]	-- 0.99 -- 0.98	-- 0.97 0.96* 0.95 1.00*	-- 0.97 0.97* 0.96 0.99*	-- 0.99 1.01* 0.94 0.98*	-- 1.03 0.97* 0.97 0.99*
	[illegible]	[illegible]	340[illegible]	[illegible]	T/2/T/4	-- 0.97 -- 0.97	-- 0.9[illegible] -- 0.9[illegible]	-- 0.93 -- 0.95	-- 0.97 -- 1.02	0.98 0.9[illegible]* --	0.96 0.96* --	0.96 0.97* --	0.96 0.96* --
[illegible]	[illegible]	[illegible]	[illegible]***	[illegible]	W/2/W/4	0.99 1.02	0.9[illegible] 1.00	0.99 0.9[illegible]	1.00 1.01	1.00 --	0.99 --	1.00 --	0.96 --
	[illegible]	[illegible]	[illegible]	[illegible]	W/2/W/4	0.96 1.0[illegible]	0.9[illegible] 1.01	0.97 --	0.96 --	0.97 --	0.98 --	0.96 --	1.00 --
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	W/2/W/4	0.99 0.9[illegible]	0.9[illegible] 0.96	0.98 0.99	1.00 1.00	0.98 --	1.01 --	0.99 --	0.96 --
	[illegible]	[illegible]	[illegible]	[illegible]	W/2 W/4	1.00 -- 1.00	1.0[illegible] -- 1.00	1.01 -- 0.[illegible]	1.00 -- 0.98	0.99 1.02* 0.97 1.01*	1.04 1.00* 1.00 1.01*	0.98 0.99* 0.98 1.01*	1.00 1.01* 1.00 1.00*
	[illegible]	[illegible]	[illegible]***	[illegible]	W/2/W/4	-- 0.98 --	-- 0.9[illegible] --	0.96 --	1.01 --	1.00 1.0[illegible]*	1.00 0.99*	0.98 0.99*	1.01 1.00*
	[illegible]	[illegible]	340[illegible]	[illegible]	W/2/W/4	0.99 0.99 -- 0.98	0.99 0.9[illegible] -- 0.97	-- 0.97 -- 0.97	-- 0.99 -- 0.97	0.99 0.99* 0.97 1.01*	0.99 1.01* 1.02 0.98*	0.99 1.01* 0.98 0.91*	1.01 1.0[illegible]* 0.9[illegible] 0.97*
	[illegible]	[illegible]	[illegible]***	[illegible]	T/2/T/4	-- 0.97 -- 1.00 --	-- 0.96 -- 0.96 --	-- 0.96 - 0.96 --	-- 0.99 -- 0.99 --	0.99 0.97* 0.96 0.9[illegible]*	0.98 1.00* 1.01 0.95*	0.97 0.95* 0.95 0.96*	0.96 1.01* 0.95 0.95*

TABLE IX (Concluded)

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

AF33(615)3580

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Direction*	Location*	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing: Ultimate Stress e/D=1.5	Bearing: Ultimate Stress e/D=2.0	Bearing: Yield Stress e/D=1.5	Bearing: Yield Stress e/D=2.0
Extrusions in the Heat-Treated-by-User Tempers													
2014-T62	3.250	6.3	340743	L LT	D/2/D/4	0.96 0.96	0.95 0.96	0.96 0.99	0.98 --	0.99 --	0.99 --	1.00 --	0.97 --
2024-T42	2.561	6.4	340745	L L LT	WT/2/WT/4	0.99 -- 0.98	0.97 -- 0.96	0.97 -- 0.95	0.96 -- --	0.98 0.94‡ --	0.97 0.97‡ --	0.96 1.00‡ --	0.95 0.94‡ --
2024-T62	2.562	6.4	340746	L L LT	WT/2/WT/4	0.95 -- 0.94	0.93 -- 0.93	0.94 -- 0.92	0.96 -- --	0.94 1.00‡ --	0.95 0.94‡ --	0.97 1.01‡ --	0.98 0.95‡ --
6061-T62	1.625	3.9	316691	L LT	WT/2/WT/4	1.00 1.01	1.01 1.02	1.00 --	1.02 --	1.01 --	0.98 --	1.03 --	0.99 --
7075-T62	1.225	21.0	316098	L L LT	W/2/W/4	0.97 -- 0.99	0.96 -- 0.99	0.96 -- 0.97	0.99 -- 0.99	0.99 1.02‡ --	1.02 1.00‡ --	0.98 1.01‡ --	1.01 1.00‡ --
	2.250 2.512	4.1 11.3	316100 340547	L L L LT	D/2/D/4 TW/2/TW/4	0.96 0.96 -- 0.96	0.96 0.96 -- 0.97	0.95 0.95 -- 0.96	0.97 0.96 -- --	0.96 0.97 0.97‡ --	0.98 0.96 0.97‡ --	0.97 0.97 0.97‡ --	0.98 0.97 0.97‡ --
7075-T7***†	1.225	21.2	316099	L L LT	W/2/W/4	0.97 -- 0.99	0.96 -- 0.99	0.96 -- 0.97	0.98 -- 0.98	1.01 1.03‡ --	0.98 0.95‡ --	0.99 1.03‡ --	0.98 1.01‡ --
	2.250 2.512	4.1 11.3	316101 340548	L L L LT	D/2/D/4 TW/2/TW/4	0.94 0.96 -- 0.97	0.93 0.94 -- 0.95	0.94 0.94 -- 0.94	0.93 0.95 -- --	1.01 0.95 0.97‡ --	0.95 0.95 0.97‡ --	0.96 0.94 0.95‡ --	0.94 0.98 0.97‡ --
7178-T62	1.500	11.3	340553	L L LT LT	TW/2/TW/4	0.97 -- 0.97 --	0.96 -- 0.94 --	0.95 -- 0.97 --	1.00 -- 0.96 --	0.98 0.97‡ 0.96 1.00‡	0.99 1.00‡ 1.03 1.00‡	0.98 0.98‡ 0.92 0.97‡	0.99 1.00‡ 0.92 0.95‡

* L - Longitudinal; LT - Long-Transverse
* T - Thickness, W - Width; D - Diameter
‡ Edgewise bearing specimens; others - flatwise specimens
** Producer B; all others from Producer A
-- Sample was in the [illegible] Temper
‡‡ Sample was in the [illegible] Temper
*** Bearing specimen failed before reaching yield stress (2 per cent offset)
*** Temper designation not strictly correct. Suitable number not yet assigned

TABLE LX

RATIOS OF BEARING PROPERTIES IN THE EDGEWISE DIRECTION TO THOSE IN THE FLATWISE DIRECTION FOR ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Sample Number	Location*	Direction†	Edgewise/Flatwise BUS(E)/BUS(F) e/D=1.5	Edgewise/Flatwise BUS(E)/BUS(F) e/D=2.0	Edgewise/Flatwise BYS(E)/BYS(F) e/D=1.5	Edgewise/Flatwise BYS(E)/BYS(F) e/D=2.0
Stress-Relieved Stretched Extrusions									
2024-T6510	1.755	7.2	340487*	T/2,W/4	L	[illegible]	[illegible]	[illegible]	1.00
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
2024-T3510	1.150	5.6	318077	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
**	1.200	3.9	317946	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
	1.450	7.3	318021*	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	1.705	4.5	340217	T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	2.520	6.6	[illegible]*	T/4,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	4.000	24.0	340214	T/4,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	2.760	29.1	318048	T/4,W/4	L	[illegible]	1.04	[illegible]	1.03
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	4.500	30.7	340368	T/4,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
2024-T8510	1.150	5.6	318078	T/2,W/4	L	[illegible]	[illegible]	0.95	[illegible]
**	1.200	3.9	317895	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
	1.450	7.3	318025*	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	0.96	[illegible]	[illegible]	[illegible]
	1.705	4.8	340169	T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	2.520	8.8	340420*	T/4,W/4	L	[illegible]	[illegible]	[illegible]	1.02
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	2.760	29.1	31807?	T/4,W/4	L	[illegible]	[illegible]	**	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	**	[illegible]
	4.000	24.0	340225	T/4,W/4	L	[illegible]	[illegible]	1.00	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	4.500	30.7	340359	T/4,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
					LT	[illegible]	0.90	[illegible]	[illegible]
6061-T6510	1.004	2.0	340423*	T/2,W/4	L	[illegible]	[illegible]	0.97	0.97
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	1.240	2.7	317507	T/2,W/2	L	[illegible]	[illegible]	[illegible]	1.00
	1.490	4.5	340409*	T/2,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	0.98
	1.560	4.4	317892	T/2,W/2	L	[illegible]	1.00	1.00	1.02
	3.000	15.0	340226	T/4,W/4	L	[illegible]	[illegible]	[illegible]	1.00
					LT	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	5.500	33.0	[illegible]	[illegible]	LT	[illegible]	[illegible]	[illegible]	[illegible]
				D/4	L	[illegible]	[illegible]	[illegible]	1.00
					LT	[illegible]	[illegible]	[illegible]	0.99

Alloy and Temper	Sample Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Sample Number	Location*	Direction†	Edgewise/Flatwise BUS(E)/BUS(F) e/D=1.5	Edgewise/Flatwise BUS(E)/BUS(F) e/D=2.0	Edgewise/Flatwise BYS(E)/BYS(F) e/D=1.5	Edgewise/Flatwise BYS(E)/BYS(F) e/D=2.0
7075-T6510	[illegible]	27.1	317660	T/2,W/4	L	0.66	[illegible]	0.90	0.97
					LT	0.67	0.90	0.89	[illegible]
				T/2,W/2	L	0.86	[illegible]	[illegible]	1.00
					LT	0.90	[illegible]	0.88	0.92
	[illegible]	27.1	[illegible]	T/2,W/4	L	[illegible]	[illegible]	[illegible]	0.97
					LT	[illegible]	[illegible]	[illegible]	0.96
				T/2,W/2	L	[illegible]	[illegible]	1.00	1.00
					LT	[illegible]	[illegible]	[illegible]	0.91
	[illegible]	27.0	[illegible]	T/4,W/4	L	[illegible]	[illegible]	0.90	0.97
					LT	[illegible]	[illegible]	[illegible]	0.96
				T/2,W/2	L	[illegible]	[illegible]	0.96	0.99
					LT	0.85	[illegible]	0.91	0.95
	[illegible]	8.2	340404	T/4,W/4	L	[illegible]	0.96	1.02	1.00
				T/2,W/2	L	0.99	[illegible]	1.02	[illegible]
	[illegible]	11.2	340444	T/4,W/4	L	[illegible]	[illegible]	1.00	1.00
				T/2,W/2	L	[illegible]	[illegible]	0.99	0.99
	[illegible]	13.6	[illegible]	T/4,W/4	L	[illegible]	[illegible]	0.99	0.99
					LT	[illegible]	[illegible]	0.94	[illegible]
				T/2,W/2	L	[illegible]	0.96	1.00	[illegible]
	[illegible]	24.2	[illegible]	T/4,W/4	L	[illegible]	[illegible]	0.95	0.99
					LT	0.96	0.97	[illegible]	1.00
				T/2,W/2	L	0.93	0.91	0.97	0.98
					LT	[illegible]	0.90	0.95	[illegible]
	5.000	30.0	340502	T/4,W/4	L	0.98	0.95	0.98	0.99
					LT	0.94	[illegible]	0.97	[illegible]
				T/2,W/2	L	[illegible]	1.00	1.00	0.99
[illegible]	[illegible]	5.7	[illegible]	T/2,W/4	L	[illegible]	[illegible]	0.96	0.97
					LT	[illegible]	[illegible]	0.94	0.95
				T/2,W/2	L	0.96	0.97	1.02	1.02
	[illegible]	27.1	[illegible]	T/2,W/4	L	0.99	[illegible]	0.96	1.01
					LT	[illegible]	[illegible]	0.96	0.96
				T/2,W/2	L	[illegible]	0.92	0.98	0.99
					LT	0.98	[illegible]	0.99	[illegible]
	[illegible]	8.2	340440	T/4,W/4	L	1.00	0.96	0.99	0.98
				T/2,W/2	L	[illegible]	1.01	1.02	1.01
	[illegible]	11.3	[illegible]	T/4,W/4	L	0.97	0.97	0.99	1.00
					L	0.96	0.99	1.00	1.00
	[illegible]	24.3	[illegible]	T/4,W/4	L	0.95	0.95	[illegible]	0.96
					LT	[illegible]	0.92	0.91	0.96
				T/2,W/2	L	0.95	0.95	0.97	0.97
					LT	0.96	[illegible]	0.97	0.96
	5.000	30.0	340504	T/4,W/4	L	0.99	0.98	0.99	1.01
					LT	0.94	[illegible]	0.96	[illegible]
				T/2,W/2	L	0.99	1.00	1.00	1.01
[illegible]	[illegible]	27.1	[illegible]	T/2,W/4	L	0.84	0.94	0.94	0.99
					LT	[illegible]	[illegible]	0.92	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	0.96	[illegible]
					LT	[illegible]	0.96	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	T/4,W/4	L	[illegible]	[illegible]	[illegible]	[illegible]
				T/2,W/2	L	[illegible]	[illegible]	[illegible]	[illegible]
	1.500	11.3	340557	T/2,W/4	L	[illegible]	[illegible]	0.99	1.00
					LT	[illegible]	0.96	0.96	0.96
				T/2,W/2	L	0.89	[illegible]	[illegible]	1.00
					LT	[illegible]	[illegible]	0.90	0.99
	[illegible]	25.5	[illegible]	T/4,W/4	L	0.90	0.90	0.98	0.97
					LT	[illegible]	[illegible]	0.92	0.98
				T/2,W/2	L	[illegible]	[illegible]	0.96	[illegible]
					LT	[illegible]	[illegible]	[illegible]	0.97

TABLE LXI (Concl.)

RATIOS OF BEARING PROPERTIES IN THE EDGEWISE DIRECTION TO THOSE IN THE FLATWISE DIRECTION FOR ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.	Number	Location*	Direction†	Edgewise/Platwise: BUS(E)/BUS(F) e/D=1.5	BUS(E)/BUS(F) e/D=2.0	BYS(E)/BYS(F) e/D=1.5	BYS(E)/BYS(F) e/D=2.0
				Extrusions in the "Heat-Treated-by-User" Tempers					
2014-T62	3.250	8.3	340543‡	D/4	L	0.98	0.99	1.01	0.97
2024-T42	2.562	6.4	340245	T/4,W/4	L	0.98	0.97	0.96	0.98
				T/2,W/2	L	0.94	0.97	0.99	0.97
2024-T62	2.562	6.4	340246	T/4,W/4	L	0.95	0.97	0.98	0.99
				T/2,W/2	L	1.01	0.96	1.02	0.96
6061-T62	1.625	3.9	318091	T/2,W/2	L	0.98	0.99	0.98	0.98
7075-T62	1.225	21.2	318098‡	T/2,W/4	L	0.88	0.94	0.96	1.03
				T/2,W/2	L	0.90	0.92	[illegible]	[illegible]
					LT	0.87	0.91	0.94	0.99
	2.250	4.1	318100	D/4	L	1.02	1.01	1.00	1.02
	2.812	11.3	340547	T/4,W/4	L	0.97	0.99	1.00	0.98
				T/2,W/2	L	0.97	1.00	1.01	0.99
7075-T73§	1.225	21.2	318099‡	T/2,W/4	L	0.86	0.94	0.96	0.96
				T/2,W/2	L	0.88	0.91	0.99	0.99
					LT	0.89	0.91	0.99	0.99
	2.250	4.1	318101	D/4	L	0.97	0.97	0.99	0.99
	2.812	11.3	340548	T/4,W/4	L	0.98	0.97	0.99	1.01
				T/2,W/2	L	1.00	0.99	1.00	1.00
7178-T62	1.500	11.3	340559	T/2,W/4	L	0.90	0.91	0.97	0.96
					LT	0.86	0.96	0.92	0.93
				T/2,W/2	L	0.89	[illegible]	0.98	0.98
					LT	0.90	0.93	0.97	0.96

* T - Thickness; W - Width; D - Diameter
† L - Longitudinal; LT - Long-Transverse
‡ Producer B; all others from Producer A
§ Temper designation not strictly correct. Suitable number not yet assigned.
** Bearing Specimen failed before reaching yield stress (2 per cent offset)
†† Sample was in the T3511 temper
‡‡ Sample was in the T8511 temper

TABLE LXII

RESULTS OF TENSILE AND COMPRESSIVE STRESS-STRAIN AND MODULUS OF ELASTICITY TESTS

[AF33(615)-3580]

Alloy and Temper	Sample Thickness, in.	Sample Number	Longitudinal Tensile Ultimate Stress, psi	Longitudinal Tensile Yield Stress,* psi	Longitudinal Tensile Elongation in 2 in. or 4D, %	Longitudinal Tensile Modulus, 10^6 psi	Longitudinal Compressive Yield Stress,* psi	Longitudinal Compressive Modulus, 10^6 psi	Long-Transverse Tensile Ultimate Stress, psi	Long-Transverse Tensile Yield Stress,* psi	Long-Transverse Tensile Elongation in 2 in. or 4D, %	Long-Transverse Tensile Modulus, 10^6 psi	Long-Transverse Compressive Yield Stress, psi	Long-Transverse Compressive Modulus, 10^6 psi
2014-T6510	0.[illegible]50	340154	65 800	62 900	12.0	10.69	63 600	11.01	69 [illegible]	64 600	4.5	[illegible]	[illegible]	[illegible]
	0.[illegible]	340486†	70 600	62 400	12.6	10.99	65 500	11.05	[illegible] 000	61 500	[illegible]	10.75	[illegible]	[illegible]
	0.750	317924	76 400	71 000	12.0	10.95	72 900	10.95	--	--	--	--	--	--
	1.[illegible]55	340487†	67 200	63 000	13.5	10.85	63 000	11.18	66 100	61 300	6.0	10.65	[illegible] 200	11.0[illegible]
-T62	0.300	318084	74 500	67 300	12.0	10.68	69 700	10.77	72 [illegible]00	67 200	5.0**	10.65	71 400	11.0[illegible]
2024-T3510	0.255	317942	79 400	62 100	16.0	10.75	52 700	10.83	77 500	55 500	22.0	10.55	[illegible]	11.1[illegible]
	0.642	317945	76 200	61 600	10.9	10.85	52 500	11.03	68 000	51 200	9.7	10.55	55 600	11.04
	1.450**	318021†	80 100	60 900	15.0	10.93	57 800	11.24	[illegible] 600	50 800	12.3	11.01	54 200	11.2[illegible]
	4.000	340214	79 400	60 500	15.5	10.92	58 300	10.98	62 500	47 400	6.0	10.53	[illegible] 100	11.0[illegible]
	2.760	318048	77 000	59 900	14.0	10.88	56 300	11.06	60 800	47 400	5.8	10.51	40 500	11.20
-T8510	0.255	317690	77 200	71 000	10.5	10.85	73 900	[illegible]	77 [illegible]	72 500	12.0	10.7[illegible]	73 [illegible]	[illegible]
	0.642	317694	73 400	67 200	8.6	10.91	68 800	11.[illegible]	70 [illegible]	65 800	3.9	10.5[illegible]	[illegible]	[illegible]
	1.450**	318025†	73 [illegible]	67 100	9.0	10.92	68 800	11.27	70 400	65 700	5.0	10.79	[illegible] 000	11.27
	2.760	318079	69 700	63 000	11.0	10.98	64 500	11.04	64 700	61 100	2.2	10.65	63 900	11.20
	4.000	340225	68 800	60 600	11.5	11.03	61 200	11.05	6[illegible] 300	59 500	3.0	10.61	62 600	11.20
-T42	2.562	340245	81 000	56 300	14.5	10.89	59 600	11.15	66 300	45 000	10.0	10.55	45 600	10.[illegible]7
-T62	2.562	340246	70 800	58 700	11.5	11.00	61 300	11.07	64 300	53 100	6.0	10.66	[illegible] 600	10.[illegible]
6061-T6510	0.075	317857	46 100	39 500	14.5**	9.68	39 500	9.71	44 000	36 000	16.5	9.72	[illegible] 600	10.23
	0.310	317905	48 000	43 400	15.5	9.99	43 000	10.08	49 100	44 500	16.5**	10.25	45 400	10.51
	0.375	317927	44 500	41 200	17.0	9.72	40 500	9.74	44 700	39 600	19.0	9.95	42 000	10.23
	3.000	340226	52 900	49 600	16.0	10.50	49 800	10.54	45 500	42 800	1[illegible].5	10.30	45 900	10.69
	5.500	317897	51 400	45 900	15.0	10.48	45 600	10.75	44 [illegible]	37 700	13.5	10.30	40 400	10.72
-T62	0.246	318090	48 000	44 100	17.0	9.49	45 200	9.66	45 600	41 300	19.0	9.75	[illegible] 600	10.02
7075-T6510	0.209	340403	94 300	86 500	12.0	10.41	87 500	10.83	89 400	80 200	12.0	10.35	89 800	11.05
	0.438	317859	86 300	79 000	14.5	10.32	78 200	10.56	85 600	77 200	10.0	10.55	83 600	10.90
	0.935	340155	87 300	80 000	12.5	10.50	80 500	10.76	81 500	72 600	12.0	10.47	79 400	10.87
	1.188	317860	85 300	78 100	14.5	10.39	78 500	10.56	82 500	74 300	14.0	10.59	80 700	10.96
	2.190	318137†	82 100	74 000	11.0	10.54	74 600	10.70	76 800	68 100	10.0	10.54	73 200	10.95
	2.812	340494	89 700	83 300	13.5	10.57	87 000	10.83	77 200	67 800	6.0	10.30	76 000	10.91
	3.040	318138†	86 000	78 700	12.0*	10.58	81 800	10.74	74 500	66 200	6.3	10.25	73 000	10.85
	5.000	340503	86 600	78 000	13.0	10.52	77 600	10.69	73 700	61 100	7.0	10.20	68 200	10.55

(Continued)

TABLE LXII (Concl.)

RESULTS OF TENSILE AND COMPRESSIVE STRESS-STRAIN AND MODULUS OF ELASTICITY TESTS

[AF33(615)-3580]

Alloy and Temper	Sample		Longitudinal						Long-Transverse					
			Tensile				Compressive		Tensile				Compressive	
	Thickness, in.	Number	Ultimate Stress, psi	Yield Stress,* psi	Elongation in 2 in. or 4D, %	Modulus, 10^6 psi	Yield Stress,* psi	Modulus, 10^6 psi	Ultimate Stress, psi	Yield Stress,* psi	Elongation in 2 in. or 4D, %	Modulus, 10^6 psi	Yield Stress, psi	Modulus, 10^6 psi
7075-T73510	0.209	340393	75 600	66 000	11.0	10.36	65 500	10.68	72 900	62 900	13.0	10.61	66 [illegible]	10.[illegible]7
	0.438	317910	77 200	67 800	11.0‡	10.36	68 500	10.47	76 400	67 800	10.0	10.56	70 [illegible]	[illegible]
	0.935	340292	76 500	69 000	13.5	10.44	70 600	10.65	74 400	65 800	11.0	10.43	70 600	[illegible]
	1.000	340439	74 900	66 100	14.5	10.58	67 300	10.70	72 100	62 400	11.0	10.45	66 000	[illegible]
	2.812	340495	73 700	66 200	14.0	10.55	69 400	10.79	67 200	58 100	9.0	10.26	62 000	10.77
	5.000	340504	72 800	64 700	13.5	10.51	65 600	10.60	65 300	53 600	9.5	10.26	57 600	[illegible]
-T62	1.225	318098†	84 100	74 600	13.5	10.51	78 800	10.83	79 500	70 700	7.5	10.35	77 200	11.06
-T73††	1.225	318099†	75 000	66 700	12.0	10.50	71 600	10.92	72 300	64 400	7.5	10.45	69 600	10.[illegible]
7079-T6510	0.146	340406	85 200	78 300	11.0	10.31	77 100	10.56	79 100	73 300	4.0	10.29	78 000	10.66
	0.500	340424†	82 100	73 800	15.5	10.28	73 600	10.53	81 000	71 200	20.0	[illegible]	77 400	10.[illegible]
-T62	0.222	340549	83 500	75 800	12.0	10.39	79 600	10.47	--	--	--	--	--	--
7178-T6510	0.180	340395	93 300	86 300	10.5	10.42	86 600	10.57	91 800	85 800	9.0	10.66	95 300	11.04
	0.390	340506	91 500	83 100	12.0	10.35	82 300	10.84	89 700	79 900	12.0	10.42	86 200	11.04
	0.625	317997	95 000	88 200	11.7	10.38	86 800	10.59	88 900	79 900	9.7	10.42	87 400	10.70
	2.180	318140†	91 800	84 100	8.5	10.59	84 100	10.85	81 700	73 600	5.5	10.48	80 000	10.94
-T62	0.403	340249	97 300	87 600	11.0	10.32	95 000	10.89	91 600	83 200	8.0	10.44	93 900	11.06

* Offset equals 0.2 per cent
† Producer B; all others from Producer A
** Samples were in -TX511 tempers
‡ Specimen failed through gage mark
‡‡ Specimen failed outside gage mark
†† Temper designation not strictly correct. Suitable number not yet assigned.

TABLE LXIII

AVERAGE RESULTS OF MODULUS DETERMINATIONS

Alloy and Temper	Thickness Range, in.	Number of Samples	Average Modulus Values, 10^6 psi			
			Tension		Compression	
			Longitudinal	Long-Transverse	Longitudinal	Long-Transverse
			TX51X Tempers			
2014-T6510	0.250-1.755	4	10.87	10.68	11.05	11.11
2024-T351X	0.255-4.000	5	10.87	10.65	11.03	11.08
2024-T851X	0.255-4.000	5	10.94	10.73	11.09	11.20
6061-T6510	0.075-0.375	3	9.80	9.98	9.84	10.29
6061-T6510	3.000-6.500	2	10.49	10.30	10.70	10.70
7075-T6510	0.209-5.000	8	10.48	10.41	10.71	10.93
7075-T73510	0.209-5.000	6	10.47	10.44	10.65	10.84
7079-T6510	0.146-0.500	2	10.30	10.29	10.54	10.79
7178-T6510	0.180-2.190	4	10.44	10.50	10.71	10.93
			Heat-Treated-by-User Tempers			
2014-T62	0.300	1	10.68	10.65	10.77	11.05
2024-T42	2.562	1	10.89	10.55	11.15	10.97
2024-T62	2.562	1	11.00	10.68	11.07	10.92
6061-T62	0.246	1	9.49	9.75	9.66	10.02
7075-T62	1.225	1	10.51	10.35	10.83	11.00
7075-T73*	1.225	1	10.50	10.45	10.92	10.98
7079-T62	0.222	1	10.39	--	10.47	--
7178-T62	0.403	1	10.32	10.44	10.89	11.06
			Weighted Averages			
2014 and 2024	0.250-4.000	17	10.88	10.67	11.04	11.10
6061	0.075-0.375	4	9.72	9.92	9.80	10.22
6061	3.000-6.500	2	10.49	10.30	10.70	10.70
7075,7079 and 7178	0.146-5.000	24	10.44	10.42	10.69	10.90

* Temper designation not strictly correct. Suitable number not yet assigned.

TABLE LXIV

RESULTS OF FRACTURE-TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS OF ALUMINUM ALLOY EXTRUSION

([illegible])

SAMPLE			SPECIMEN				FATIGUE PRE-CRACKING				AT INITIAL INDICATION OF CRACK GROWTH							AT 5 PER CENT SECANT OFFSET							
Section Thickness, in.	Cross-Sectional Area, in.²	Number	Orientation and Number	Type See [illegible]	Width (W), in.	Thickness (B), in.	Original Crack Length (a), in.	[illegible]	Max. Stress, psi	Cycles	Load (P), lb	Gross Stress (σ), psi	Net Stress (σn), psi	σ_n/σ_{ys}	K_c, psi$\sqrt{in.}$	$(K_c/\sigma_{ys})^2$, in.	$B/(K_c/\sigma_{ys})^2$	Load (P), lb	Gross Stress (σ), psi	Net Stress (σn), psi	σ_n/σ_{ys}	K_Q, psi$\sqrt{in.}$	$(K_Q/\sigma_{ys})^2$, in.	$B/(K_Q/\sigma_{ys})^2$	Meaningful K_{Ic} §
[illegible]																									
[illegible]																									
0.2?1	3.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	1? ?00	4? 600	0.7?	?? ?00	0.2?	1.3?	Yes
0.62?	3.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? ?00	?? ?00	4? 300	0.7?	2? ?00	0.2?	1.??	Yes
0.?40	1.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	? 000	0.??	21 ?00	0.2?	2.4?	Yes
[illegible]	[illegible]	[illegible]**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? 000	0.?	2? 600	0.20	2.9?	Yes
											[illegible]							[illegible] WIDTH OF SPECIMEN							
											[illegible]							[illegible] WIDTH OF SPECIMEN							
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	? ?00	0.?	41 000	0.4?	?.??	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	--	[illegible]	4? ?00	0.?	4? ?00	0.4?	2.?8	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	? ?00	0.??	24 ?00	0.1?	?.?4	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? ?00	0.?	2? 0?0	0.1?	?.??	Yes§§
[illegible]																									
0.25?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	4? ?00	0.44	0.?4	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.?	No
0.510	20.?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	4? 4?0	0.?	2? ?00	0.2?	1.1?	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? 700	0.?	?4 ?00	0.??	0.?	No
0.?42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? ?00	0.??	4? ?00	0.??	0.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	? ?00	1? ?00	4? ?00	0.?	2? ?00	0.?	?.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	?? ?00	0.??	?.?	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	? 4?0	0.??	?3 ?00	0.?4	?.??	No
1.4?0	[illegible]	[illegible]**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	? 4?0	? ?0?	0.??	? 500	0.?4	?.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	4? ?00	0.??	?? 500	0.??	2.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? ?00	0.??	?? ?00	0.50	?.?0	No
2.??0	2?.?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? ?00	0.??	?? ?00	0.??	?.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	?? ??0	0.??	?? 500	0.22	?.74	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	4? ?00	0.??	?? ?00	0.??	?.6?	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	--	--	--	[illegible]	[illegible]	4? ?00	0.??	46 ?00	0.??	?.??	No
4.000	24.?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	4? ?00	0.??	?? ?00	0.2?	?.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	0.??	?? ?00	0.??	?.??	No
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	4? ?00	0.?	?? ?00	0.??	2.5?	Possibly
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	?? ?00	? ?00	4? 000	0.4?	49 ?00	0.64	2.6?	Possibly
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	? 150	6 ?00	3? 800	0.7?	2? 800	0.19	2.5?	Possibly
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	? 150	[illegible]	3? 700	0.7?	2? 600	0.22	2.?4	No
[illegible]																									
?.2??	2.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	1? ?00	4? 500	0.??	27 600	0.1?	1.44	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	47 ?00	0.??	25 500	0.1?	1.??	Yes
0.?1?	20.?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4? ?00	0.6?	2? 400	0.09	2.2?	Yes
0.642	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? 9?0	[illegible]	45 500	0.??	2? 700	0.0?	2.2?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? 10?	[illegible]	3? ?00	0.5?	26 300	0.1?	?.22	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	3? 4?0	0.5?	2? 300	0.1?	3.46	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	?? 12?	[illegible]	26 500	0.3?	22 600	0.1?	5.6?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	2? 000	0.??	22 200	0.10	5.92	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	?? 000	0.5?	1? 500	0.06	?.64	Yes
1.4??	[illegible]	[illegible]**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? ?00	3? 200	0.5?	30 000	0.19	5.35	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	?? ??	? 00?	3? ?00	0.5?	2? 300	0.1?	?.6?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? ?00	?? 500	0.??	18 300	0.0?	4.9?	Yes
2.?0?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? 100	? ?00	0.4?	1? 100	0.0?	5.1?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	4? 50?	? 200	2? 100	0.4?	29 200	0.2?	5.9?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	4? ??0	? 400	2? 500	0.4?	2? 700	0.2?	5.81	Yes
4.00?	24.?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? ? 400**	?4 000	?5 500	? 000	27 400	0.44	3? ?00	0.28	0.62	? 12?	? ?00	3? 000	0.5?	1? 500	0.0?	4.9?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	?? 200	6 ?00	2? 970	0.44	32 400	0.2?	6.65	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	? 500	[illegible]	?? ?00	0.4?	?? 100	0.2?	6.9?	Yes
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3? ?00	0.??	16 000	0.0?	5.??	Yes§§
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2? 500	0.4?	1? 800	0.08	5.9?	Yes

(Continued)

TABLE LXIV (Continued)

RESULTS OF FRACTURE-TOUGHNESS TESTS OF [illegible] SPECIMENS OF ALUMINUM ALLOY EXTRUSIONS

(AF33(615)-3590)

Section Thickness, in.	Number	Load (P), lb	Gross Stress (σ), psi	Net Stress (σ_n), psi	$\frac{\sigma_n}{\sigma_{ys}}$	K_Q, psi$\sqrt{in.}$	$\left(\frac{K_Q}{\sigma_{ys}}\right)^2$, in.	$\frac{a}{\left(\frac{K_Q}{\sigma_{ys}}\right)^2}$	Meaningful K_{Ic}
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	---
		[illegible] FAILED BEFORE 5 PER CENT OFFSET OBTAINED							
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
		[illegible] WIDTH OF SPECIMEN							
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 300	0.83	[illegible] 100	0.24	0.9[illegible]	No
		[illegible]	[illegible]	[illegible] 600	[illegible]	[illegible] 900	[illegible]	[illegible]	No
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 600	[illegible]	[illegible]	Not
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 500	[illegible]	[illegible] 700	[illegible]	[illegible]	Not
		[illegible]	[illegible]	[illegible]	0.62	[illegible]	[illegible]	1.3[illegible]	Yes
		[illegible]	[illegible]	[illegible] 500	[illegible]	34 [illegible]00	0.24	1.5[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 300	[illegible]	31 400	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible] 800	[illegible]	32 500	0.27	[illegible]	Yes
		[illegible]	[illegible]	[illegible] 000	[illegible]	30 600	[illegible]	3.7[illegible]	Yes
		[illegible]	[illegible]	[illegible] 600	[illegible]	32 400	0.21	3.[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 000	[illegible]	27 700	0.17	[illegible]	Yes§§
		[illegible]	[illegible]	[illegible] 400	[illegible]	24 100	0.14	2.[illegible]	Yes§§
		[illegible]	[illegible]	48 900	[illegible]	36 400	0.30	2.54	Yes
		[illegible]	[illegible]	47 100	0.70	35 300	0.25	2.70	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 600	0.64	28 700	0.21	1.49	Yes
		[illegible]	[illegible]	[illegible] 300	0.84	26 000	0.17	1.81	Yes
		[illegible]	[illegible]	[illegible] 900	[illegible]	35 600	0.29	3.41	Yes
		[illegible]	[illegible]	[illegible] 600	[illegible]	33 200	0.26	3.92	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 300	[illegible]	22 700	0.15	2.06	Yes
		[illegible]	[illegible]	[illegible] 200	[illegible]	24 800	0.16	1.7[illegible]	Yes§§
		[illegible]	[illegible]	[illegible] 900	[illegible]	42 900	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible] 300	[illegible]	43 500	[illegible]	[illegible]	Yes
		[illegible]	[illegible]	[illegible] 700	0.72	23 400	0.19	2.6[illegible]	Yes
		6 000	[illegible]	[illegible] 200	[illegible]	20 000	0.14	3.60	Yes

(Continued)

TABLE LXIV (Continued)

RESULTS OF FRACTURE-TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS OF ALUMINUM ALLOY EXTRUSIONS

(AF33(615)-3560)

Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Specimen: Direction and Number	Specimen: Type See Fig. 15	Specimen: Width (W), in.	Specimen: Thickness (B), in.	Fatigue Pre-Cracking: Original Crack Length (a), in.	Fatigue Pre-Cracking: Stress Ratio	Fatigue Pre-Cracking: Max. Stress, psi	Fatigue Pre-Cracking: Cycles	At Initial Indication of Crack Growth: Load (P), lb	Gross Stress (σ), psi	Net Stress (σ_n), psi	σ_n/σ_{ys}	K_Q, psi$\sqrt{in.}$	$(K_Q/\sigma_{ys})^2$, in.	$B/(K_Q/\sigma_{ys})^2$	At 5 Per Cent Secant Offset: Load (P), lb	Gross Stress (σ), psi	Net Stress (σ_n), psi	σ_n/σ_{ys}	K_Q, psi$\sqrt{in.}$	$(K_Q/\sigma_{ys})^2$, in.	$B/(K_Q/\sigma_{ys})^2$	Meaningful K_{Ic} §
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.66	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
			[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.44	Yes
			[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No
			[illegible]		[illegible]						--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	900 0.21	[illegible]	No
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]		[illegible]	[illegible]					--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.[illegible]	Not
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes§§
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Not

(Continued)

TABLE LXIV (Concluded)

RESULTS OF FRACTURE-TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS OF ALUMINUM ALLOY EXTRUSIONS

[illegible]

SAMPLE: Section Thickness, in.	SAMPLE: Cross-Sectional Area, in.²	SAMPLE: Source	SPECIMEN: Direction* and Number	SPECIMEN: Type See Fig. 15	SPECIMEN: Width(W), in.	SPECIMEN: Thickness(B), in.	FATIGUE PRE-CRACKING: Original Crack Length(a)†, in.	FATIGUE PRE-CRACKING: Stress Ratio	FATIGUE PRE-CRACKING: Max. Stress, psi	FATIGUE PRE-CRACKING: Cycles	AT INITIAL INDICATION OF CRACK GROWTH: Load(P), lb	Gross Stress (σ),#, psi	Net Stress (σn),**, psi	$\frac{\sigma_n}{\sigma_{ys}}$	K_Q, psi√in.	$\frac{1}{2\pi}\left(\frac{K}{\sigma_{ys}}\right)^2$, in.	AT MAXIMUM LOAD: Load(P), lb	Gross Stress, psi	Net Stress, psi	$\frac{\sigma_n}{\sigma_{ys}}$	K_c, psi√in.	[illegible]	[illegible] K_{Ic}
[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* L = Longitudinal, T = Transverse.

† At start of fracture-toughness test, i.e., after fatigue cracking.

\# P/BW.

§ Based upon nature of crack growth, load deformation curve, and thickness requirements.

** Combined (P/A + Mc/I) stress at tip of crack.

†† $K_Q = \frac{P a^{1/2}}{BW}\left[1.99-0.41(a/W)+18.70(a/W)^2-38.48(a/W)^3+53.85(a/W)^4\right]$

where P = load, lb
a = crack length (including fatigue crack), in., + $\frac{K^2}{2\pi\sigma_{ys}^2}$ (plastic zone correction factor)
B = thickness, in.
W = width, in.

‡‡ Producer B; all others Producer A.

‡ Excessive curvature in fatigue crack front.

\#\# Specimens stressed initially at a higher stress; number of cycles not included.

§§ Considerable curvature in fatigue crack front, but value appears meaningful.

*** Temper designation not strictly correct. Suitable number not yet assigned

TABLE LXV

SUMMARY OF MEANINGFUL FRACTURE-TOUGHNESS DATA
FOR ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Number	Longitudinal: Specimen Thickness, in.	Longitudinal: K_{Ic}, psi$\sqrt{in.}$* Pop-In	Longitudinal: K_{Ic}, psi$\sqrt{in.}$* Secant	Longitudinal: $B_{Ic}(K_{Ic}/\sigma_{ys})^2$ (Secant)	Long-Transverse: Specimen Thickness, in.	Long-Transverse: K_{Ic}, psi$\sqrt{in.}$* Pop-In	Long-Transverse: K_{Ic}, psi$\sqrt{in.}$* Secant	Long-Transverse: $(K_{Ic}/\sigma_{ys})^2$ (Secant)
2014-T6510	0.271	317[illegible]	0.271	2[illegible] 700	30 000	1.22	--	--	--	--
	0.[illegible]2[illegible]	3[illegible]†	[illegible]	--	[illegible] 200	2.[illegible]	--	--	--	--
	1.[illegible]	3[illegible]7†	1.[illegible]	--	31 500±	2.[illegible]	0.312	--	25 400	1.84
	Average				30 100				25 400	
2014-T62	0.500	31[illegible]04	0.2[illegible]	2[illegible] 700	29 600	1.[illegible]	0.268	28 500	28 000	1.38
2024-T8510	0.25[illegible]	317[illegible]	[illegible].21[illegible]	--	2[illegible] 000	1.4[illegible]	0.200	21 400	21 600	2.24
	0.[illegible]	317[illegible]2	[illegible].50[illegible]	27 000	2[illegible]	[illegible]	--	--	--	--
	0.[illegible]42	317[illegible]	[illegible]	--	22 400±	5.9[illegible]	0.217	15 900	16 500	3.64
	1.[illegible]	[illegible]†	1.[illegible]	[illegible]	2[illegible]	[illegible]	0.375	18 200	18 200	3.04
	2.[illegible]	[illegible]	1.2[illegible]2	--	25 400	[illegible]	0.374	16 600	16 600	4.92
	4.000	340225	1.[illegible]	32 200	32 200	[illegible]	0.500	17 900	17 900	5.88
	Average				2[illegible]				18 200	
7075-T6510	0.209	340403	[illegible].20[illegible]	2[illegible] 200	2[illegible] 200	2.1[illegible]	0.203	21 900	22 000	2.70
	0.4[illegible]	317[illegible]	[illegible].30[illegible]	2[illegible] 000	27 800	[illegible].32	0.390	27 800	27 800	3.04
	1.[illegible]	317[illegible]	1.12[illegible]	2[illegible] 800	24 [illegible]00	11.72	1.135	23 500	24 000	10.95
	[illegible].1[illegible]	[illegible]†	[illegible].010	--	2[illegible] 200	7.3[illegible]	0.500	23 100	23 200	4.40
	[illegible].[illegible]12	340[illegible]	[illegible].002	2[illegible] 500	31 400	7.2[illegible]	--	--	--	--
	3.040	[illegible]†	1.4[illegible]	2[illegible] 300	29 500	10.82	0.377	20 700	22 200	3.44
	3.000	340503	--	--	--	--	0.500	22 700	22 700	3.61
	Average				28 000				23 600	
7075-T62	1.225	313098†	--	--	--	--	0.500	--	23 800	4.52

(Continued)

TABLE LXV (Concl.)

SUMMARY OF MEANINGFUL FRACTURE-TOUGHNESS DATA
FOR ALUMINUM ALLOY EXTRUSIONS

(AF33(615)-3[illegible])

Alloy and Temper	Sample: Section Thickness, in.	Sample: Number	Longitudinal: Specimen Thickness, in.	Longitudinal: K_{Ic}, psi$\sqrt{in.}$* Pop-In	Longitudinal: K_{Ic}, psi$\sqrt{in.}$* Secant	Longitudinal: $(K_{Ic}/\sigma_{ys})^2$ (Secant)	Long-Transverse: Specimen Thickness, in.	Long-Transverse: K_{Ic}, psi$\sqrt{in.}$* Pop-In	Long-Transverse: K_{Ic}, psi$\sqrt{in.}$* Secant	Long-Transverse: B $(K_{Ic}/\sigma_{ys})^2$ (Secant)
7075-T73510	0.439	317[illegible]10	0.5[illegible]	--	3[illegible] 400	1.4[illegible]	0.400	32 000	32 000	1.79
	[illegible].935	340292	0.752	31 200	31 200	3.[illegible]	0.312	25 900	25 400	2.02
	1.000	340439	0.752	3[illegible] 200	3[illegible] 800	3.[illegible]2	0.312	27 400	27 400	1.65
	2.612	340407	1.001	--	3[illegible] 400	3.[illegible]	0.312	--	23 800	1.90
	5.000	340504	1.[illegible]7	--	4[illegible] 200‡	4.5[illegible]	0.500	--	21 700	2.62
	Average				34 2[illegible]				25 300	
7079-T6510	0.500	340424†	0.490	30 900	3[illegible] [illegible]00	3.0[illegible]	0.490	29 200	29 200	2.92
7079-T62	0.222	340549	0.223	35 600	35 800	0.9[illegible]	--	--	--	--
7178-T6510	0.162	340425†	0.162	25 200	25 300	1.7[illegible]	0.156	23 300	23 300	1.75
	0.180	340395	0.178	19 900	19 900	[illegible].92	0.175	21 400	21 400	2.92
	0.390	340505	0.390	23 200	23 200	[illegible].12	0.3[illegible]	21 800	21 800	5.33
	0.625	317907	0.320	1[illegible] 100	1[illegible] 100	14.01	0.374	18 000	18 000	7.51
	1.500	340557	1.005	22 400	24 100	12.75	0.500	20 700	22 300	5.99
	2.190	318140†	1.010	20 600	20 500	15.52	0.499	18 500	19 000	7.82
	Average				21 900				21 000	
7173-T62	0.403	340249	0.404	23 300	23 300	5.63	0.312	22 600	22 600	4.23
	1.500	340559	--	--	--	--	0.500	22 500	22 600	6.01
	Average				23 300				22 600	

* Meaningful values of K_Q from Table LXIV
† Producer B; all others from Producer A
‡ Appears unreasonable; omitted from average

TABLE LXVI

RESULTS OF AXIAL-STRESS FATIGUE TESTS OF ALUMINUM ALLOY EXTRUSIONS (R=0.0)

[AF33(615)-3580]

Alloy and Temper	Sample Thickness, in.	Sample Number	Longitudinal			Long-Transverse		
			Cycles to Failure					
Maximum Stress, psi			60 000	38 000	30 000	60 000	38 000	30 000
2014-T6510	0.750	317924	49 200	2 511 600	45 233 400*			
	1.755	340487‡‡	19 300	1 270 100	5 585 300	13 900	662 000	23 245 000*
					4 405 400			
Log-Mean Fatigue Life			30 600	1 785 000	**	--	--	--
2014-T62	3.250	340543	26 700	54 481 800†	76 763 500*	--	--	--
2024-T3511	1.450	318021‡‡	95 100	4 021 200	11 534 800	23 800	8 994 100	154 063 200
-T3510	2.750	318042	50 400	75 724 500	19 542 600	19 500††	1 706 600	26 183 200
	4.000	340214	39 300	531 000	37 521 200†	2 000	368 500	484 400
Log-Mean Fatigue Life			57 300	5 770 000	20 375 000‡	6 900	1 782 000	12 500 000
2024-T42	2.562	340245	43 600	6 715 700	17 019 200*	--	--	--
2024-T8511	1.450	318025‡‡	40 300	6 349 300	25 271 900*	23 400	506 400	74 095 400
-T8510	2.750	318079	18 500	227 400	417 600	14 500	285 000	1 423 400
			--	--	395 000	--	--	--
	4.000	340225	15 100	446 200	204 935 800*	5 100	861 000	80 232 900
Log-Mean Fatigue Life			23 000	553 700	**	12 700	499 000	20 380 000
Maximum Stress, psi			50 000	45 000	38 000			
2024-T62	2.562	304245	18 200	56 214 700†	50 911 200*	--	--	--
Maximum Stress, psi			44 000	38 000	30 000	44 000	38 000	30 000
6061-T6510	3.000	340226	396 800	9 329 700	37 785 500	43 900	265 900	1 039 000
	6.500	317597	203 700	616 200	49 329 100	24 300	79 100	8 382 300
Log-Mean Fatigue Life			284 300	2 395 000	43 170 000	32 700	145 000	2 951 000
6061-T62	1.625	318091	41 600	34 200	11 461 700	--	--	--

(Continued)

TABLE LXVI (Concl.)

RESULTS OF AXIAL-STRESS FATIGUE TESTS OF ALUMINUM ALLOY EXTRUSIONS (R=0.0)

[AF33(615)-3580]

Alloy and Temper	Sample Thickness, in.	Sample Number	Longitudinal			Long-Transverse		
			Cycles to Failure					
Maximum Stress, psi----			60 000	45 000	38 000	60 000	45 000	38 000
7075-T6510	1.188	317860	36 300	1 302 000	8 007 400	24 200	83 700	1 972 300
	2.000	317861	66 900	340 600	23 539 400	--	--	--
	2.190	318137‡‡	37 700	222 400	311 400	23 100	56 500	345 000
	2.750	340494	41 600	1 742 600	12 348 900	9 300	60 500	67 900
	3.040	318138‡‡	58 000	222 200	5 358 000†	19 100	66 600	207 200
	5.000	340503	34 200	167 500	3 087 400	10 000	31 100	67 600
Log-Mean Fatigue Life			44 300	431 200	4 784 000‡	15 800	58 700	230 300
7075-T62	1.225	318098‡‡	51 600	137 400	12 103 100	30 200	119 800	975 200
7075-T73510	0.935	340292	34 700	614 800	47 998 000	29 300	177 100	973 100
	1.000	340439	30 300	121 700	9 466 600	20 600	44 600	147 000
	2.000	317948	51 000	370 300	12 103 900	--	--	--
	2.750	340495	34 000	126 500	282 900	9 000	27 100	45 300
	5.000	340504	26 100	72 300	346 900	8 100	27 200	63 600
Log-Mean Fatigue Life			34 300	190 500	3 519 000	14 500	49 100	142 500
7075-T73 §§	1.225	318099‡‡	56 700	236 200	27 628 500	17 900	110 000	184 900
7178-T6510	1.500	340557	29 300	122 000	1 183 500	16 900	96 300	18 062 800
			--	--	4 953 000	--	--	--
	2.180	318140‡‡	49 400	1 196 700	10 105 000†	20 000	106 100	353 800
Log-Mean Fatigue Life			38 000	382 000	5 568 000‡	18 400	101 000	2 528 000
7178-T62	1.500	340559	45 000	9 898 800	105 706 500*	24 900	48 200	285 000

* Specimen did not fail
† Specimen failed in grip
‡ Includes value for specimen that failed in grip
** Log-Mean Value not computed when specimens did not fail
†† Tensile ultimate stress below 60 000 psi; fatigue specimen tested at 56 000 psi
‡‡ Producer B; all others from Producer A
§§ **Temper designation not strictly correct. Suitable number not yet assigned.**

TABLE LXVII

RESULTS OF STRESS-CORROSION CRACKING TESTS OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

Specimens Stressed 75% Yield Stress and Exposed to 3.5% NaCl Solution by Alternate Immersion

Alloy and Temper	Typical Cross-Section* w x t, inches	Sample Number	Longitudinal: Applied Stress, ksi	Longitudinal: F/N++	Longitudinal: Days+++	Longitudinal: Loss in Ultimate Tensile Stress,* %	Long-Transverse: Applied Stress, ksi	Long-Transverse: F/N++	Long-Transverse: Days+++	Long-Transverse: Loss in Ultimate Tensile Stress,* %	Short-Transverse: Applied Stress, ksi	Short-Transverse: F/N++	Short-Transverse: Days+++
2014-T6510	3.0 x 0.250	340154	47	0/2	84	5	45	2/2	2,2•••	--	--	---	--
	3.0 x 0.622	340436	48	0/2	84	16	46	0/2	84	19	--	---	--
	3.0 x 1.755	340487••	47	0/2	84		46	2/2••	2,2	--	45	2/2••	2,2
2024-T3510	3.0 x 0.255	317242	45	0/2	84	29	42	0/2	84	22	--	---	--
	2.25 x 0.510	317[illegible]	43	0/2	84	34	36	0/2	84	25	--	---	--
	2.25 x 0.[illegible]	317244	45	0/2	84	18	[illegible]	1/2	31 (OK 84)	42	[illegible]	2/2	[illegible]
	[illegible] x 1.200	317[illegible]	[illegible]	0/2	84	14	37	2/2	7,7	--	[illegible]	2/2	[illegible]
	2.25 x 2.760	[illegible]••	44	0/2	84	23	35	2/2••	12,26	--	32	1/2••	[illegible]
	[illegible] x 4.000	[illegible]214••	45	0/2	84	27	36	2/2••	2,5	--	32	2/2••	[illegible]
[illegible]24-T8510	[illegible] x 0.255	317800	53	0/2	84	[illegible]	54	0/2	84	[illegible]	--	---	--
	2.25 x 0.510	317822	50	0/2	84	8	[illegible]	0/2	84	[illegible]	--	---	--
	2.25 x 0.[illegible]	317[illegible]	51	0/2	84	6	[illegible]	0/2	84	[illegible]	[illegible]	[illegible]/2	[illegible]
	[illegible] x 1.200	317[illegible]	51	0/2	84	6	[illegible]	0/2	84	13	[illegible]	[illegible]/2••	[illegible]
	[illegible] x 2.760	3180[illegible]••	[illegible]	0/2	84	[illegible]	[illegible]	[illegible]/2••	[illegible]	17	[illegible]	[illegible]/2••	[illegible]
	[illegible] x 4.000	340225••	46	0/2	84	[illegible]	[illegible]	[illegible]/2••	[illegible]	[illegible]	[illegible]	[illegible]/2••	[illegible]
[illegible]-T6510	[illegible] x 0.312	317953	30	0/2	84	0	[illegible]	0/2	84	[illegible]	--	---	--
	[illegible] x 0.375	317927	[illegible]	0/2	84	4	[illegible]	0/2	84	1	--	---	--
	2.[illegible] x 1.240	317[illegible]••	[illegible]	0/2	84	[illegible]	[illegible]	0/2••	84	1	--	---	--
	2.25 x 1.[illegible]	317[illegible]••	35	0/2	84	[illegible]	23	0/2••	84	0	--	---	--
	[illegible] x 3.000	340226••	[illegible]	0/2	84	0	33	0/2••	84	0	31	[illegible]/2••	[illegible]
[illegible]-T6510	3.0 x 0.375	317254	51	0/2	84	[illegible]	[illegible]	1/2	1[illegible] (OK 84)	[illegible]	--	---	--
	[illegible] x 0.435	[illegible]	[illegible]	0/2	84	[illegible]	[illegible]	0/2	84	4	--	---	--
	[illegible] x 0.[illegible]	340[illegible]	[illegible]	0/2	84	[illegible]	[illegible]	1/2	[illegible] (OK 84)	27	[illegible]	2/2	[illegible]
	21.0 x 1.1[illegible]	317[illegible]	[illegible]	0/2	84	[illegible]	[illegible]	0/2	84	6	[illegible]	2/2	[illegible]
	[illegible] x 2.170	31[illegible]37	[illegible]	0/2	84	[illegible]	[illegible]	1/2	5 (OK 84)	13	[illegible]	2/2	4,4
	4.50 x 3.[illegible]	[illegible]••	[illegible]	0/2	84	[illegible]	[illegible]	2/2••	4,4	--	[illegible]	2/2••	[illegible]
	[illegible] x 3.000	340321••	[illegible]	0/2	84	23	51	2/2••	2,2	--	47	2/2••	[illegible]
	6.0 x [illegible]	340503••	[illegible]	0/2	84	[illegible]	[illegible]	2/2••	2,2	--	44	2/2••	2,2
[illegible]-T73510	[illegible] x 0.375	317400	[illegible]	0/2	84	[illegible]	47	0/2	84	[illegible]	--	---	--
	[illegible] x 0.43[illegible]	[illegible]	[illegible]	[illegible]/2	84	2	[illegible]	[illegible]/2	84	2	--	---	--
	[illegible] x 0.[illegible]	340[illegible]	[illegible]	[illegible]/2	84	[illegible]	50	[illegible]/2	84	13	32	0/2	[illegible]
	[illegible] x 1.[illegible]	340[illegible]	[illegible]	[illegible]/2	84	[illegible]	[illegible]	[illegible]/2	84	12	[illegible]	[illegible]/2	[illegible]
	[illegible]	[illegible]••	[illegible]	[illegible]/2	84	[illegible]	46	0/2••	84	10	44	[illegible]/2••	[illegible]
	[illegible]	340[illegible]••	[illegible]	0/2	84	12	[illegible]	0/2••	84	23	[illegible]	[illegible]/2••	[illegible]
[illegible]	2.[illegible] x 0.281	340[illegible]	[illegible]	0/2	84	2	54	0/2	84	[illegible]	--	---	--
	[illegible] x [illegible]	340424	[illegible]	0/2	84	[illegible]	53	0/2	84	[illegible]	--	---	--
[illegible]-T6510	[illegible] x 0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	51	1/2	81 (OK 84)	14	--	---	--
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13	[illegible]	2/2	3,7	--	[illegible]	[illegible]/2	4,[illegible]
	[illegible] x 1.[illegible]	[illegible]	[illegible]	[illegible]	84	10	[illegible]	0/2	84	11	[illegible]	[illegible]/2	[illegible]
	[illegible] x 2.1[illegible]	[illegible]	[illegible]	[illegible]	84	11	[illegible]	2/2	7,7	--	[illegible]	2/2	4,4

Notes:

\+ - Dimensions listed for portion of section from which test specimens were removed. In most cases this was the predominant section of the extruded shape.

++ - F/N denotes number of specimens failed over number exposed.

+++ - Specimens exposed for periods shown, with maximum duration of 84 days.

* - Results are average values for tensile tests of specimens that did not fail by stress-corrosion cracking.

** - Definite long-transverse and short-transverse structures not developed in this particular extruded shape.

*** - Failures occurred outside the reduced section, beneath the protective coating used to isolate all parts of the stressing frame.

§ - Microscopic examination revealed severe general intergranular attack which presumably caused considerable relaxation of applied strain, thereby preventing failure.

§§ - Accumulated corrosion products prevented detection of failure until specimens were chemically cleaned at termination of the exposure period.

TABLE LXVIII

RESULTS OF STRESS-CORROSION CRACKING TESTS OF ALUMINUM ALLOY EXTRUSIONS
IN THE "HEAT-TREATED-BY-USER" TEMPERS

Specimens Stressed 75% Yield Stress and Exposed to 3.5% NaCl Solution by Alternate Immersion

Alloy and Temper	Typical Cross-Section+ w x t, inches	Sample Number	Longitudinal: Applied Stress, ksi	Longitudinal: F/N++	Longitudinal: Days+++	Longitudinal: Loss in Ultimate Tensile Stress,* %	Long-Transverse: Applied Stress, ksi	Long-Transverse: F/N++	Long-Transverse: Days+++	Long-Transverse: Loss in Ultimate Tensile Stress,* %	Short-Transverse: Applied Stress, ksi	Short-Transverse: F/N++	Short-Transverse: Days+++
2014-T62	11.0 x 0.300	311084	50	1/2	24*** (OK 84)	11	48	1/2	24*** (OK 84)	13	--	---	--
2024-T42	3.00 x 0.430 3.00 x 2.562	340241 340245**	36 42	0/2 0/2	84 84	30 30	36 34	0/2 2/2**	84 2,2	40 --	-- 33	--- 2/2**	-- [illegible]
2024-T62	3.00 x 0.430 3.00 x 2.562	340242 340246**	43 40	0/2 0/2	84 84	0 13	43 39	0/2 0/2**	84 84	13 11	-- 40	--- 0/2**	-- [illegible]
6061-T62	10.0 x 0.246 2.375 x 1.025	318090 318081**	33 31	0/2 0/2	84 84	0 2	31 30	0/2 0/2**	84 84	2 1	-- 31	--- 0/2**	-- [illegible]
7075-T6	2.625 x 0.350 5.25 x 1.225	318016 318069	61 56	0/2 0/2	84 84	6 4	57 54	0/2 0/2	84 84	7 7	-- 52	--- 2/2	-- [illegible]
7075-T73$$	2.625 x 0.350 5.25 x 1.225	318071 318070	50 50	0/2 0/2	84 84	2 1	48 49	0/2 0/2	84 84	4 5	-- 46	--- 0/2	-- [illegible]
7178-T6	6.00 x 0.403	340249	67	2/2	37,42	--	62	2/2	37,42	--	--	---	--

Notes:
+ - Dimensions listed for portion of sample from which test specimens were removed. In most cases this was the predominant section of the extruded shape.
++ - F/N denotes number of specimens failed over number exposed.
+++ - Specimens exposed for periods shown, with maximum duration of 84 days.
* - Results are average values for tensile tests of specimens that did not fail by stress-corrosion cracking.
** - Definite long-transverse and short-transverse structures not developed in this particular extruded shape.
*** - Failures occurred outside the reduced section, beneath the protective coating used to isolate all parts of the stressing frame.
$ - Accumulated corrosion prevented detection of failures. Specimens were chemically cleaned to confirm suspected failure.
$$ - Temper designation not strictly correct. Suitable ber not yet assigned

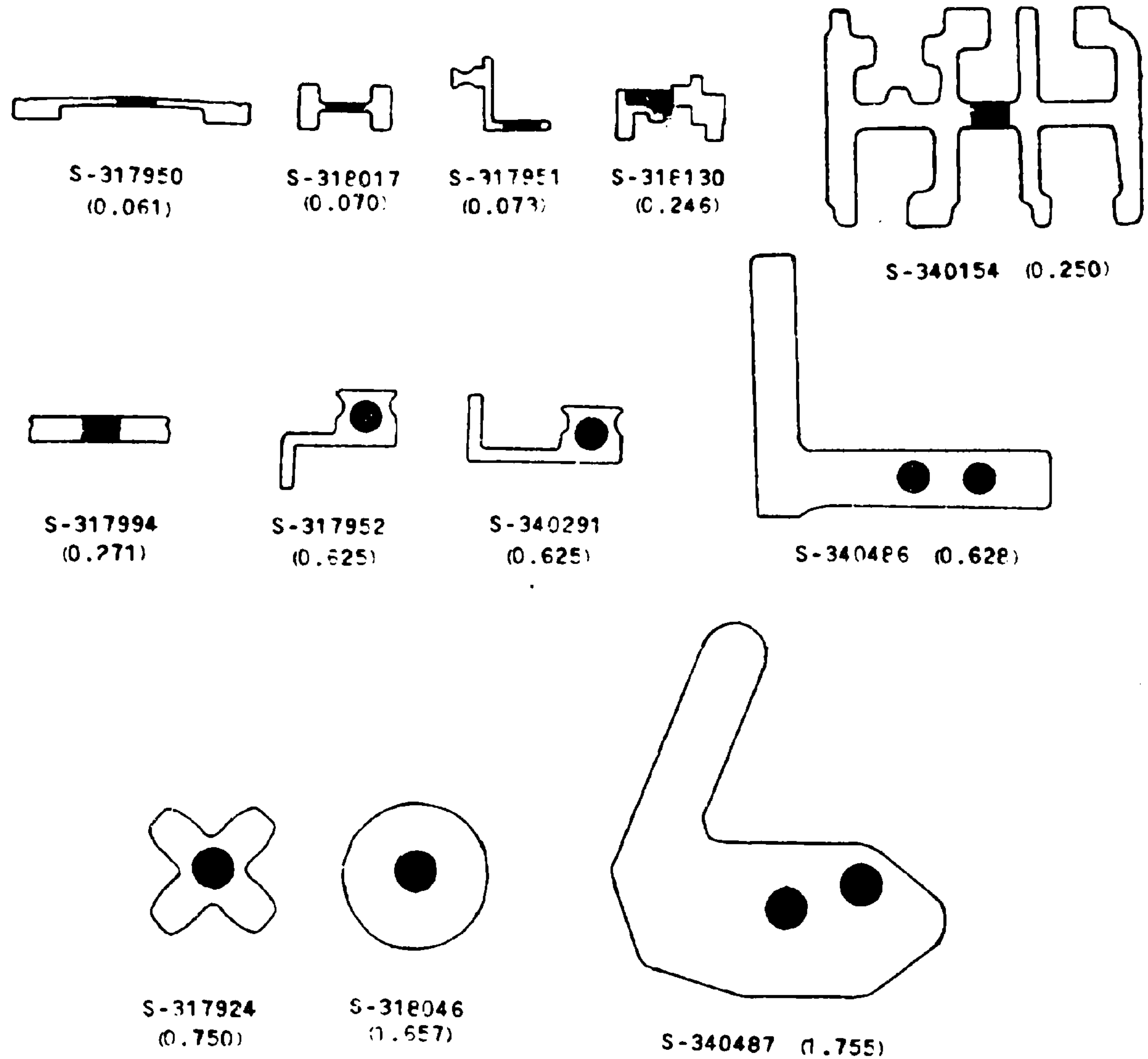


Fig. [illegible] General Locations of Test Specimens in Cross-Sections (ca. 1/2x) of Stress-Relieved Stretched 2024-T6510 Aluminum Alloy Extrusions

(Number in parenthesis: Test-Section Thickness, in.)

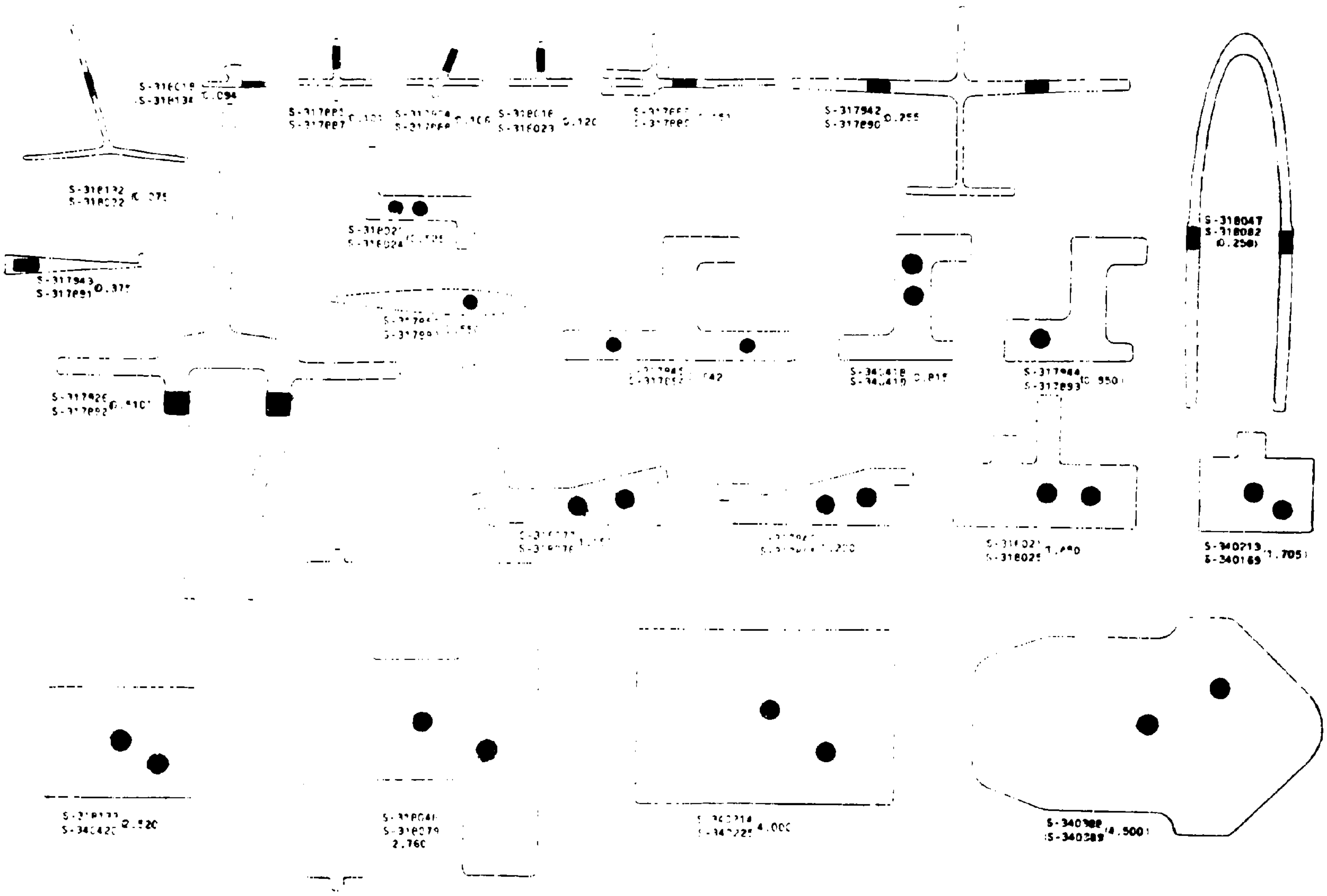


Fig. 2 General Locations of Test Specimens in Cross-Sections (ca. 1/3x) of Stress-Relieved Stretched 2024-T351X and -T851X Aluminum Alloy Extrusions

(Numbers in Parenthesis: Test-Section Thickness, in.)

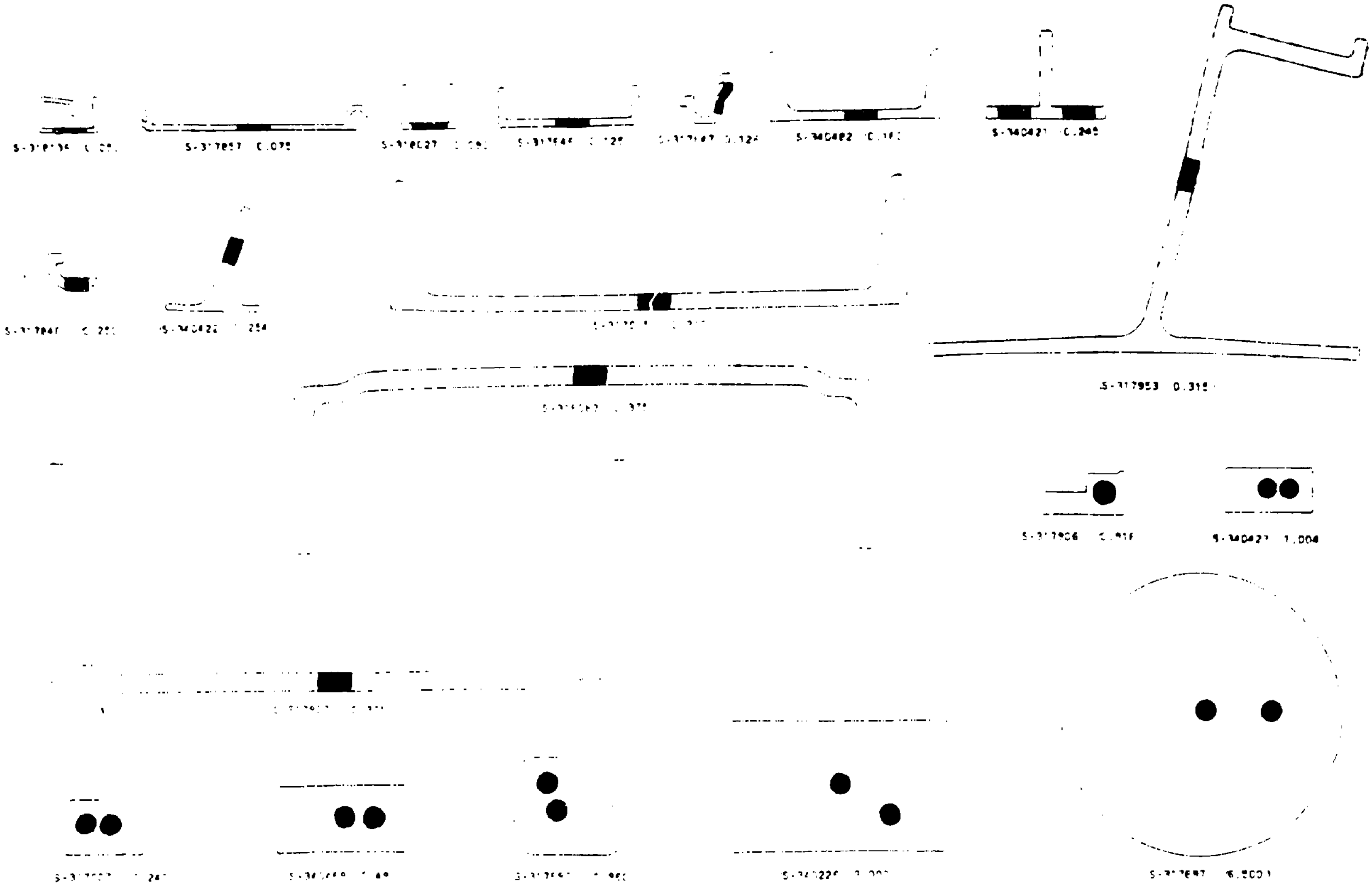


Fig. 3 ... Locations of Test Specimens in Cross-Sections (ca. 1/3x) of ... Extrusions

(...)

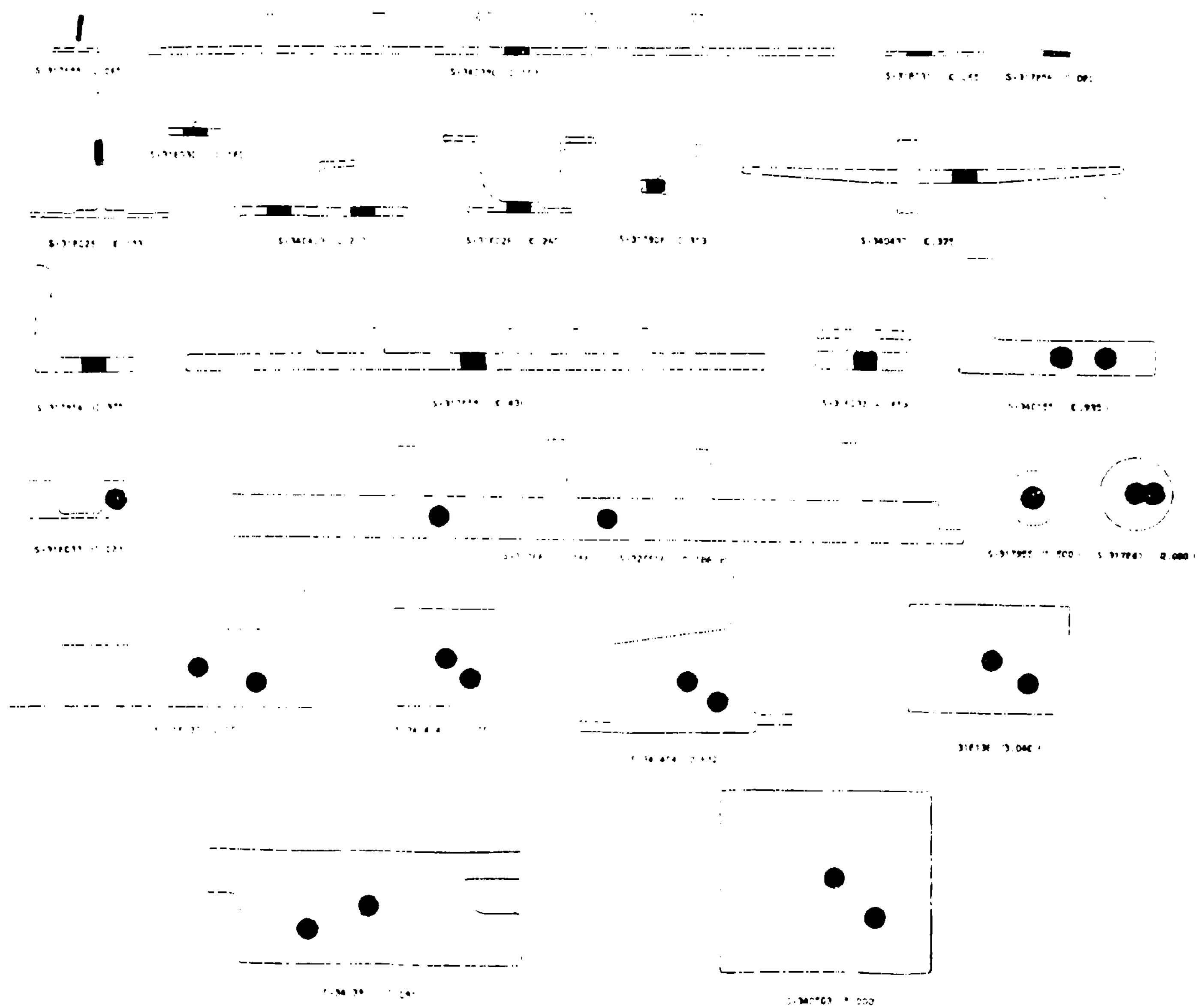


Fig. 4 General Locations of Test Specimens in Cross-Sections (ca. 1/4x) of Stress-Relieved Stretched 7075-T6510 Aluminum Alloy Extrusions

(Numbers in Parenthesis: Test-Section Thickness, in.)

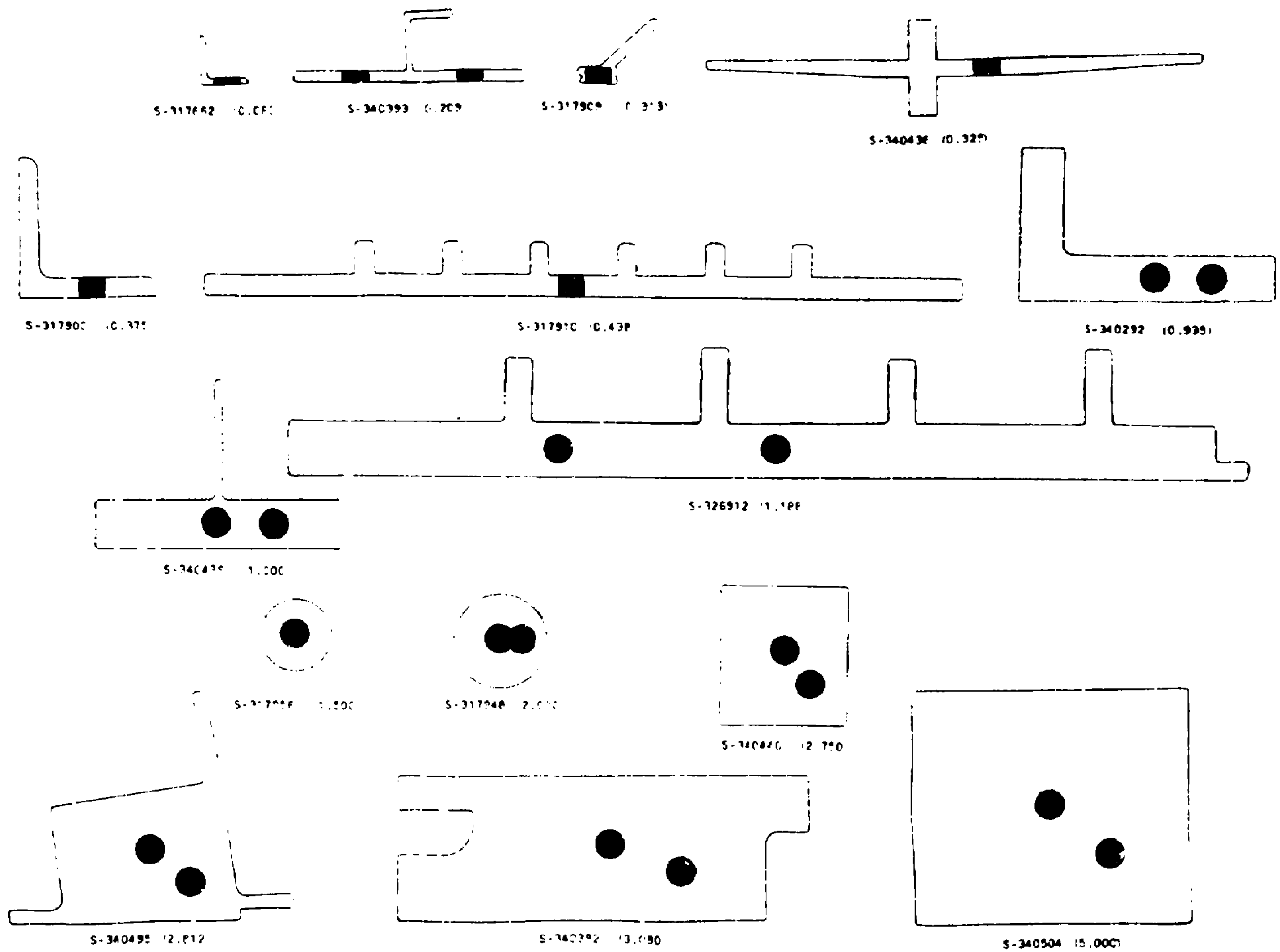


Fig. 5 General Locations of Test Specimens in Cross-Sections (ca. 1/3x) of Stress-Relieved Stretched 7075-T73510 Aluminum Alloy Extrusions

(Number in Parenthesis: Test-section Thickness, in.)

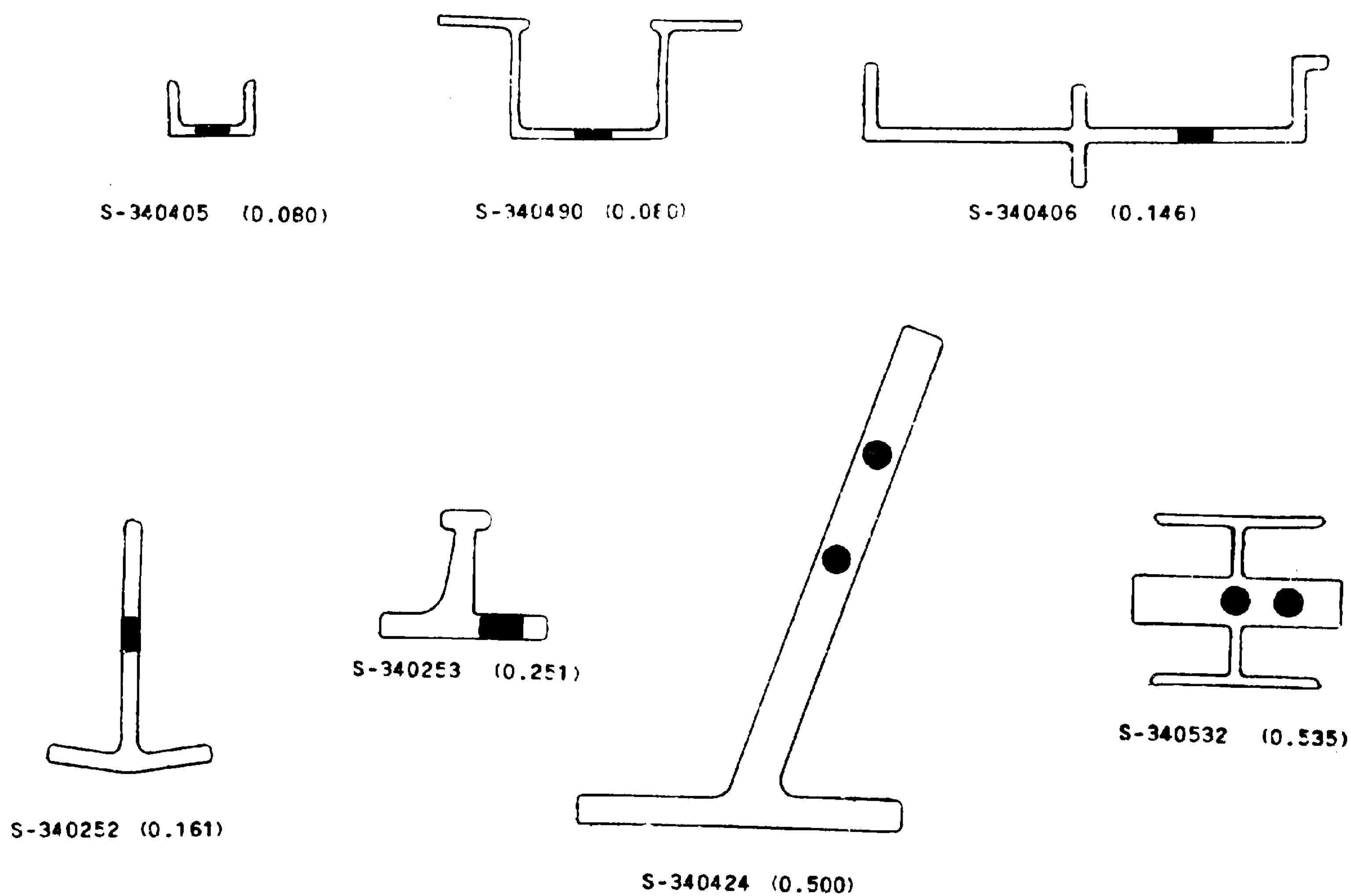


Fig. 6 General Locations of Test Specimens in Cross Sections (ca. 1/2x) of Stress-Relieved Stretched 7079-T6510 Aluminum Alloy Extrusions

(Numbers in Parenthesis: Test-Section Thickness, in.)

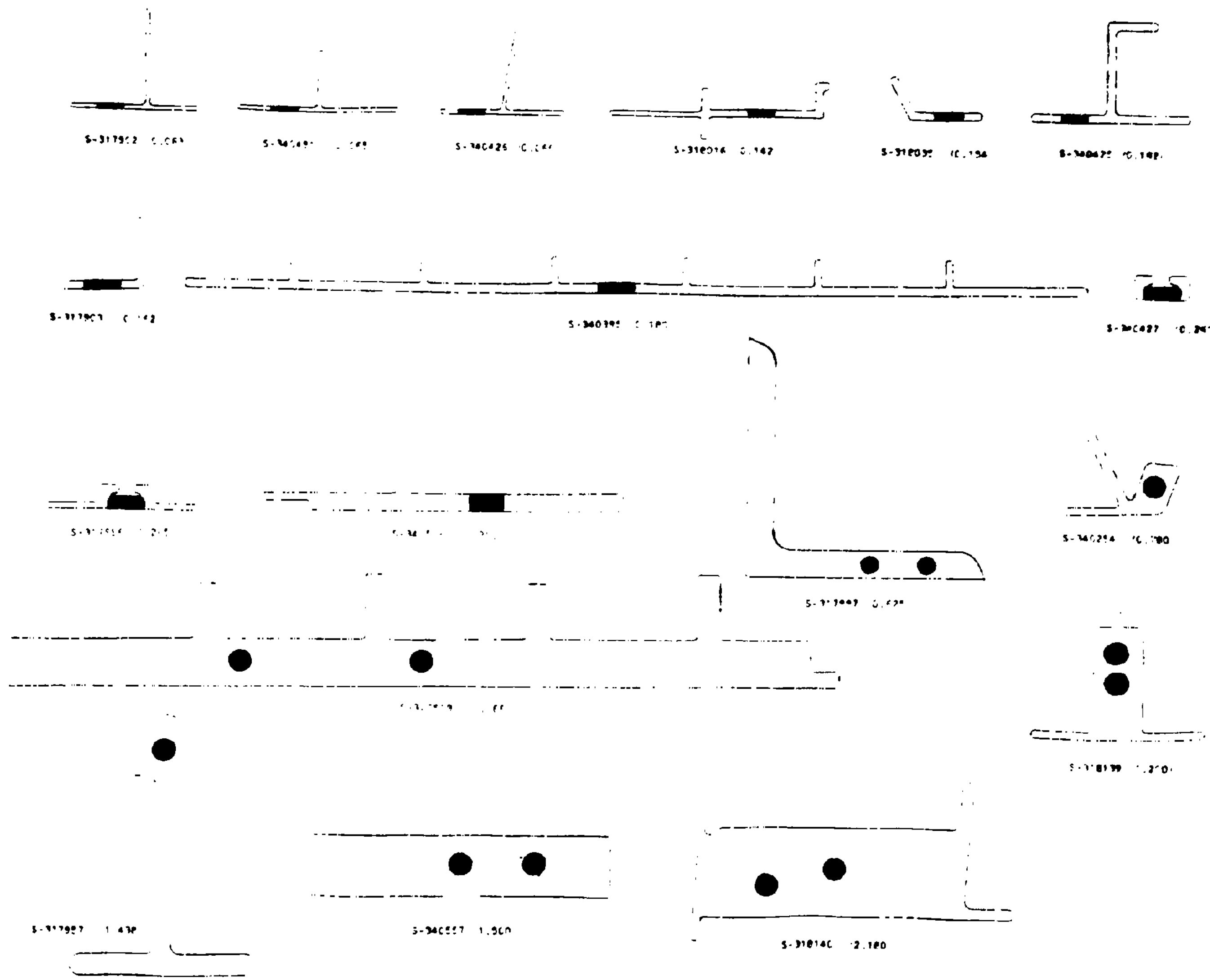


Fig. 7 General Locations of Test Specimens in Cross-Sections (ca. 1/2x) of Stress-Relieved Stretched 7178-T6510 Aluminum Alloy Extrusions

(Numbers in Parenthesis: Test-Section Thickness, in.)

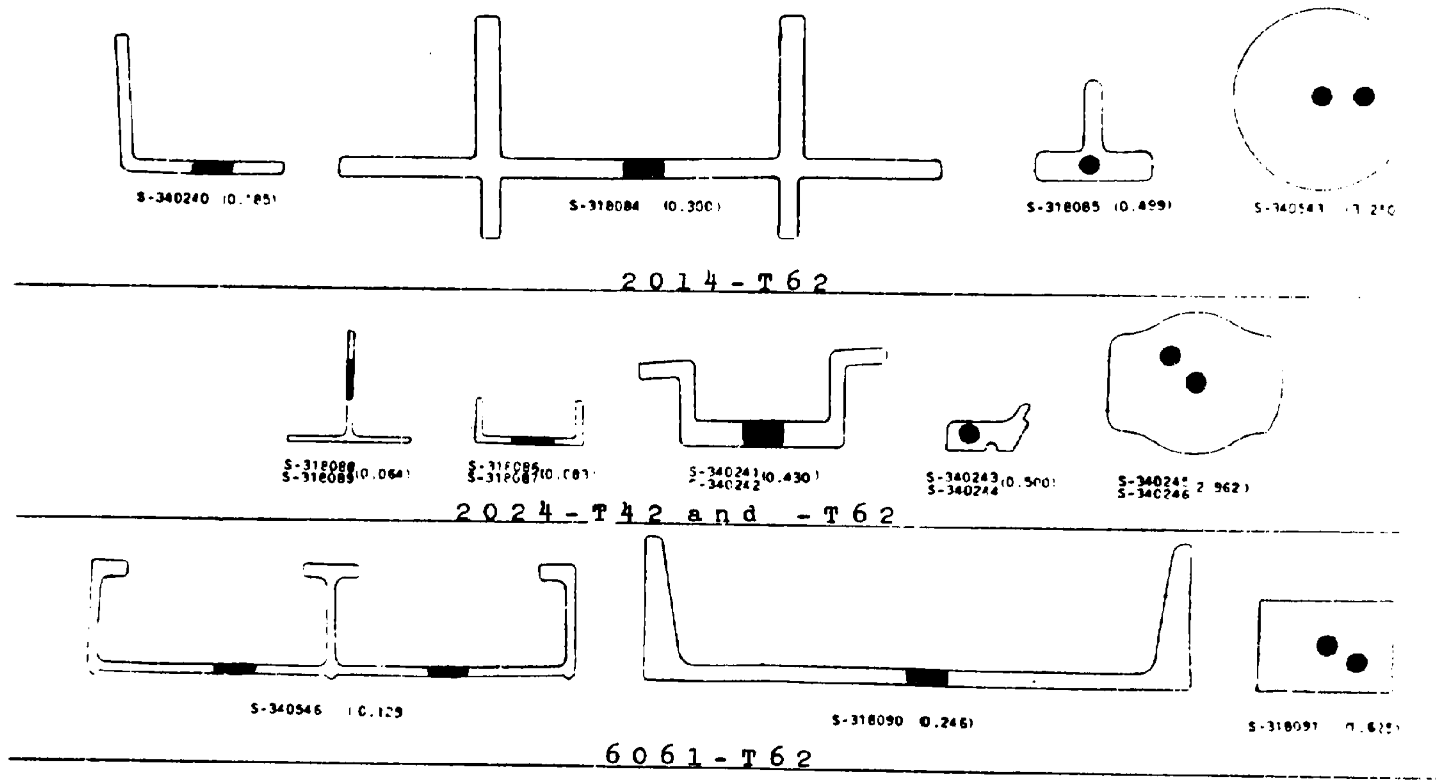


Fig. 8 General Locations of Test Specimens in Cross Sections (ca. 2/5x) of 2014, 2024 and 6061 Aluminum Alloy Extrusions in the "Heat-Treated-By-User" Tempers

(Numbers in Parenthesis: Test Section Thickness, in.)

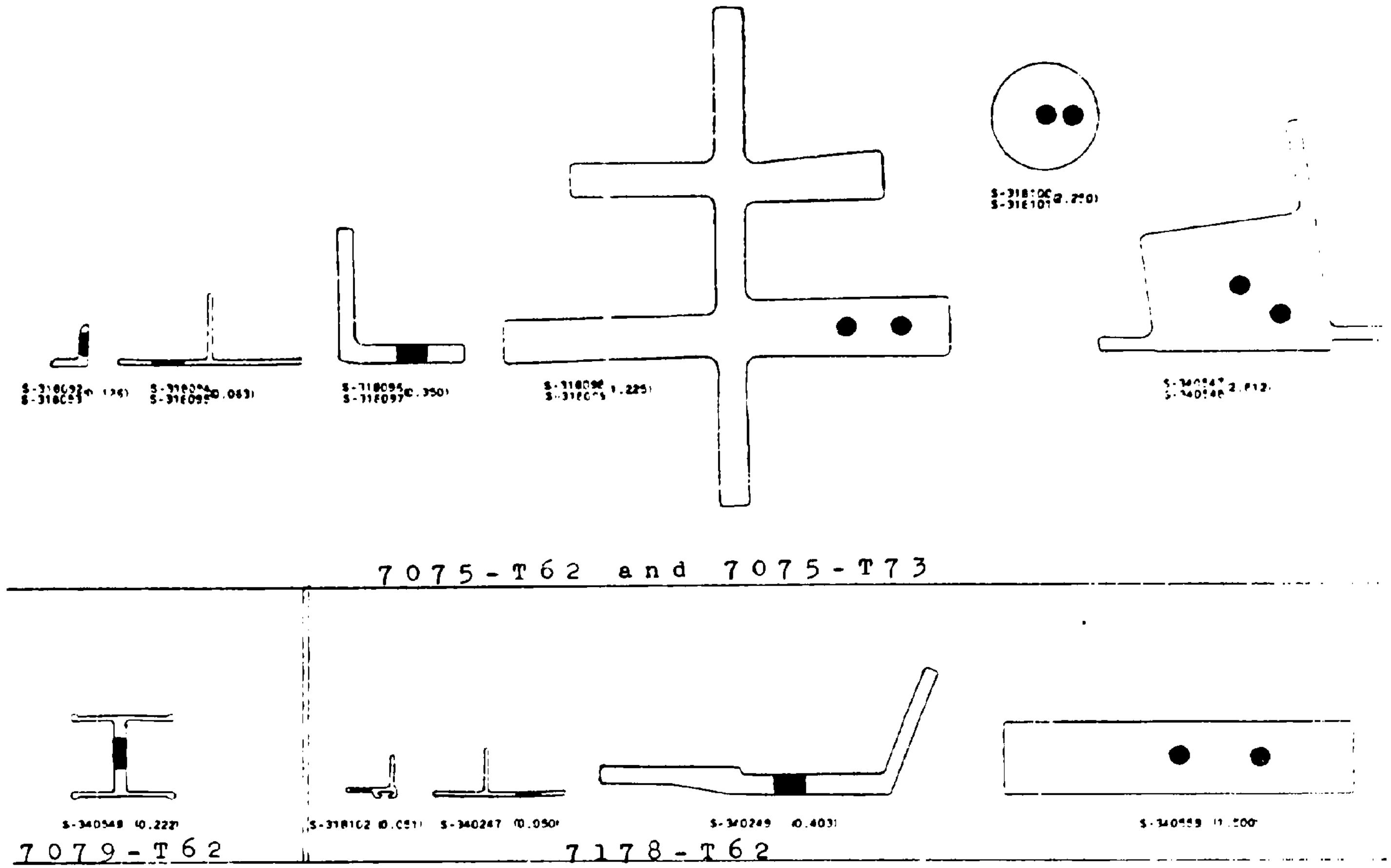
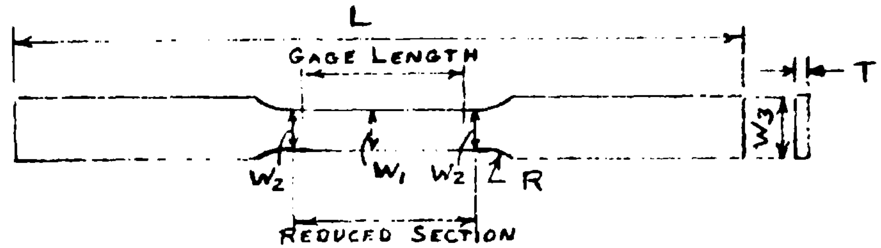


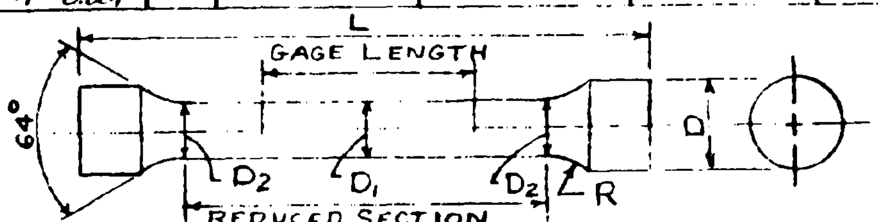
Fig. 9 General Locations of Test Specimens in Cross Sections (ca. 1/3x) of 7075, 7079 and 7178 Aluminum Alloy Extrusions in the "Heat-Treated-By-User" Tempers

(Numbers in Parenthesis: Test-Section Thickness, in.)



SHEET-TYPE SPECIMENS

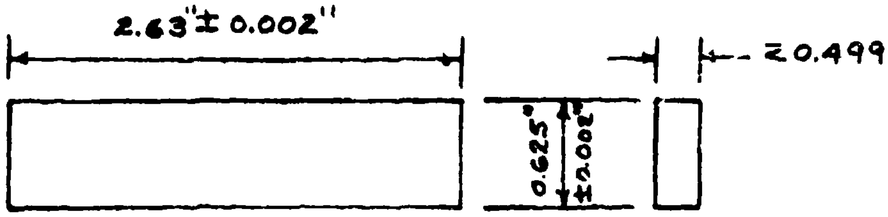
Width, in.			Gage Length, in.	Reduced Section Length, in.	Radius (R), in.	Thickness (T), in.	Length (L), in.
W_1	W_2	W_3					
0.500 ± 0.010	$W_1 + ^{0.005}_{0.003}$	3/4	2.000 ± 0.002	2-1/4	7/8	≥ 0.499	9 Min.
0.250 ± 0.002	$W_1 + ^{0.003}_{0.002}$	3/8	1.000 ± 0.002	1-1/4	3/8	≥ 0.250	4 Min.
0.125 ± 0.001	$W_1 + ^{0.0015}_{0.001}$	3/16	0.500 ± 0.002	5/8	3/16	≥ 0.125	2-1/4 Min.



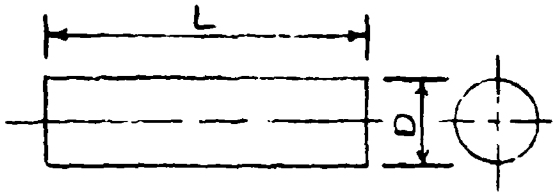
TAPERED-SEAT SPECIMENS

Diameter, in.		Gage Length, in.	Reduced Section Length, in.	Radius (R), in.	Diameter (D), in.	Length (L), in.
D_1	D_2					
0.500 ± 0.005	$D_1 + ^{0.005}_{0.003}$	2.000 ± 0.002	3-1/8	3/8	3/4	4-3/4
0.357 ± 0.004	$D_1 + ^{0.004}_{0.003}$	1.400 ± 0.002	2-15/64	17/64	17/32	3-3/8
0.250 ± 0.003	$D_1 + ^{0.002}_{0.001}$	1.000 ± 0.002	1-9/16	3/16	3/8	2-3/8
0.160 ± 0.002	$D_1 + ^{0.002}_{0.001}$	0.640 ± 0.002	1	0.120	15/64	1-1/2
0.125 ± 0.001	$D_1 + ^{0.002}_{0.001}$	0.500 ± 0.002	25/32	3/32	3/16	1-1/4

Fig. 10 General Dimensions of Tensile Specimens

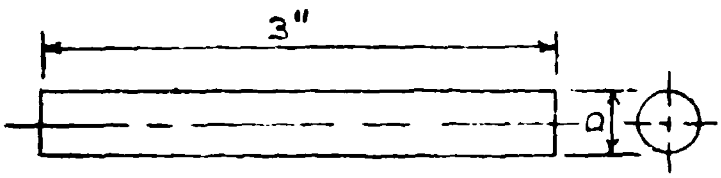


Sheet-Type Compressive Specimen



NOMINAL DIAM, IN.	D, IN.	L, IN.
1/2	0.4980 / 0.4950	1-29/32 / 1-27/32
7/16	0.4390 / 0.4360	1-21/32 / 1-5/8
3/8	0.3765 / 0.3735	1-17/32 / 1-1/2

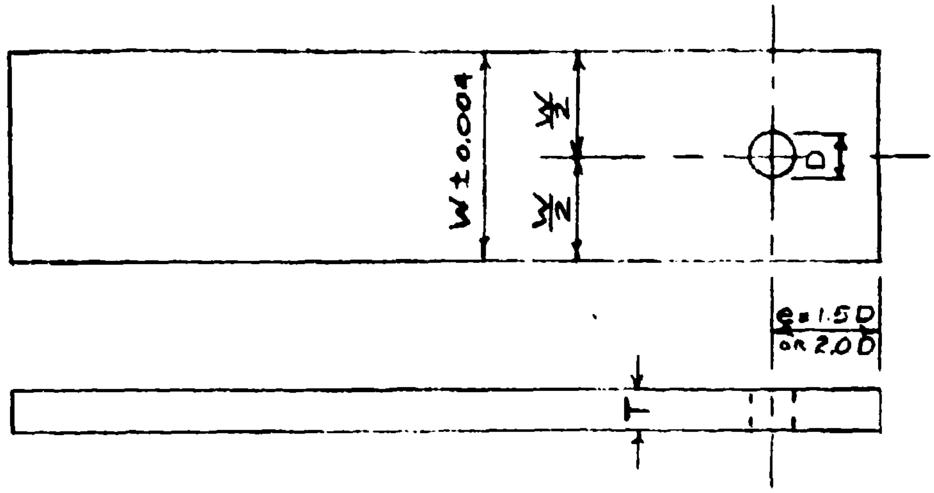
Round Compressive Specimen



NOMINAL DIAM, IN.	D, IN.
3/8	0.3730 / 0.3720
1/4	0.2490 / 0.2480
3/16	0.1865 / 0.1835

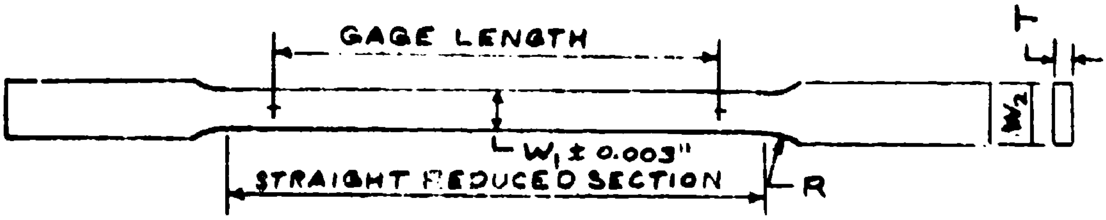
Shear Specimen

Fig. 11 General Dimensions of Compressive and Shear Specimens



TYPE	T, IN.	W, IN.	D, IN.
A	0.063	1	$\frac{0.2500}{0.2505}$
B	0.040 - 0.074	1-1/2	$\frac{0.2500}{0.2505}$
C	0.075 - 0.109	1-1/2	$\frac{0.3750}{0.3755}$
D	0.110 - 0.250	2	$\frac{0.5000}{0.5005}$

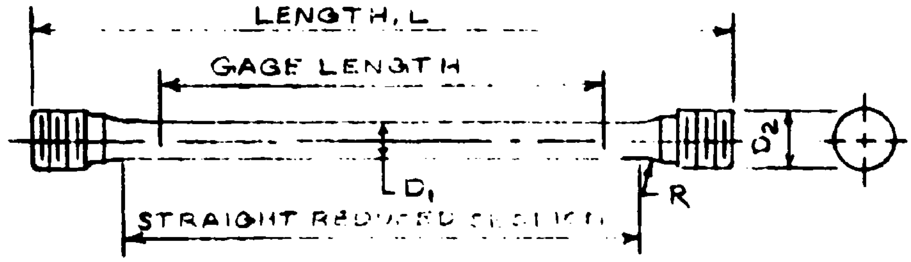
Fig. 12 General Dimensions of Bearing Specimens



WIDTH, IN.		GAGE LENGTH, IN.	REDUCED SECTION LENGTH, IN.	RADIUS (R), IN.	THICKNESS (T), IN.
W_1	W_2				
0.500 ± 0.003	3/4	6.000 ± 0.002*	7*	7/8	≤ 0.499
0.250 ± 0.002	3/8	1.000 ± 0.002	1-1/2	3/8	≤ 0.250

* FOR SOME LONG-TRANSVERSE SPECIMENS, GAGE LENGTHS – 4 IN., REDUCED-SECTION LENGTHS – 5 IN.

Sheet-Type Specimens

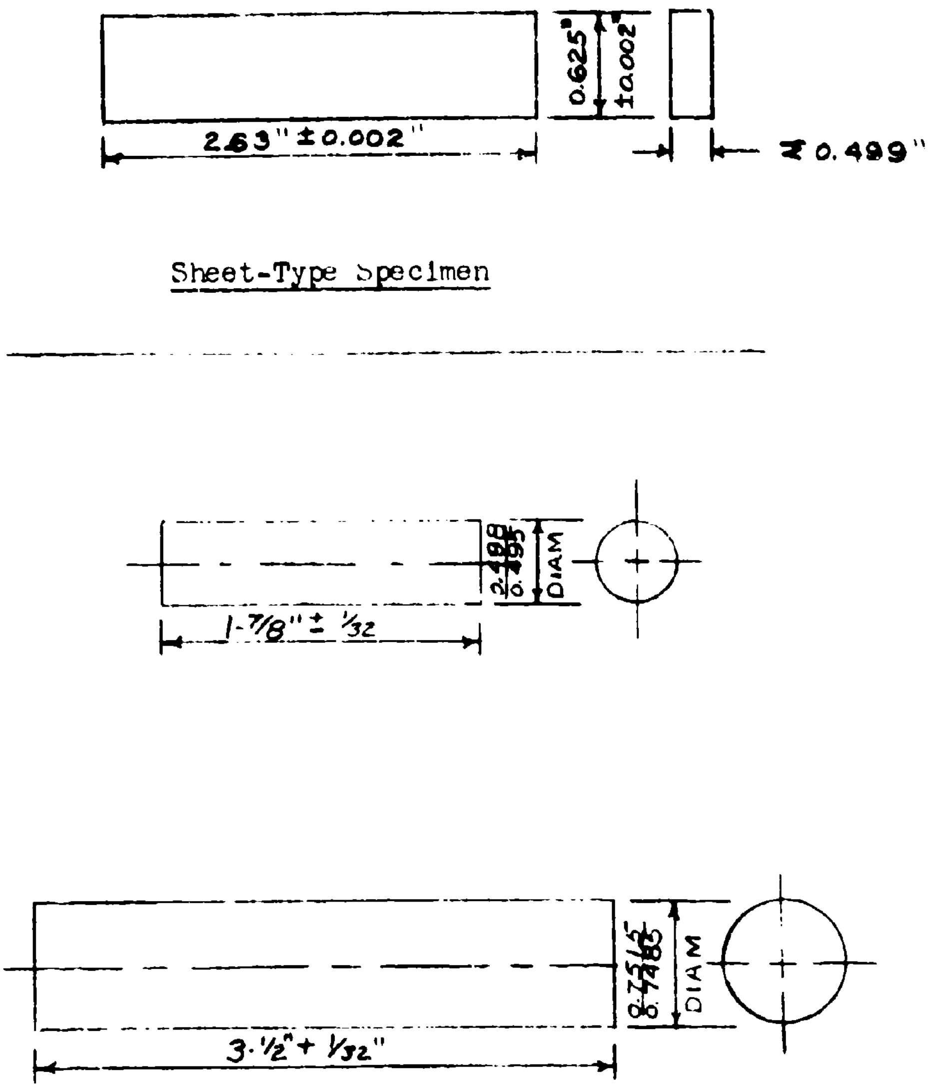


DIAMETER, IN.		GAGE LENGTH, IN.	REDUCED SECTION LENGTH, IN.	RADIUS (R), IN.	LENGTH (L), IN.
D_1	D_2				
0.500 ± 0.003	3/4	6.000 ± 0.002	7	5/8	9-1/2
0.500 ± 0.003	3/4	4.000 ± 0.002	5	5/8	7-1/2
0.500 ± 0.003	3/4	2.000 ± 0.002	3†	5/8	5-1/2†
0.438 ± 0.003	5/8	2.000 ± 0.002	2-7/8†	≥ D_1	5-1/4†
0.375 ± 0.003	9/16	2.000 ± 0.002	2-3/4	≥ D_1	5

† FOR SHORTER LONG-TRANSVERSE SPECIMENS, GAGE LENGTHS – 1 IN., REDUCED-SECTION LENGTHS – 1 IN. PLUS TWO TIMES D_1

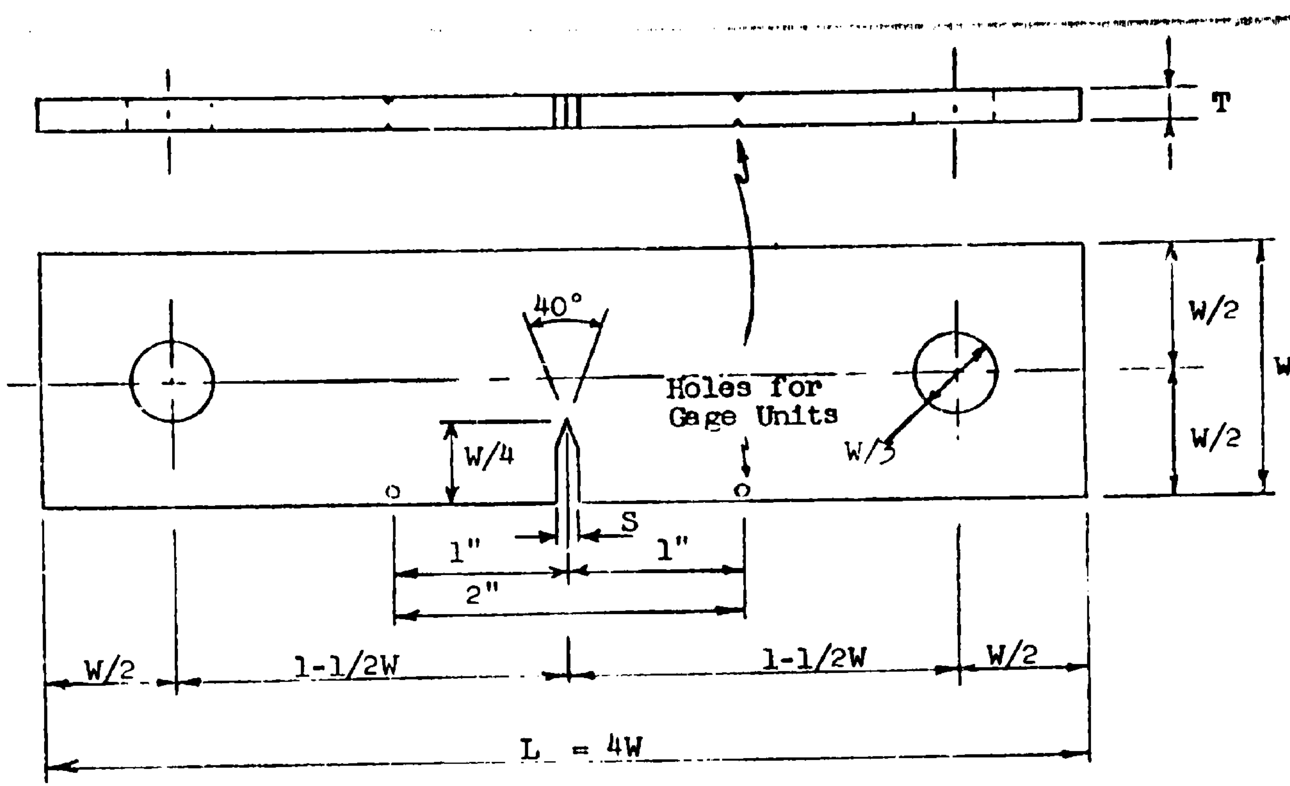
Round Specimens

Fig. 13 General Dimensions of Tensile Specimens For Modulus and Stress-Strain Tests



Round Specimens

Fig. 14 General Dimensions of Compressive Specimens For Modulus and Stress-Strain Tests



Type	W	T	L	S
1	15/16	3/16-5/16	3-3/4	1/8
2	1-1/2	3/16-1/2	6	1/8
3	2-1/4	3/8-3/4	9	5/16
4	3	3/8-1	12	5/16
5	4-1/2	1-1/8-1-1/2	18	5/16
6	6	1-2	24	5/16

Fig. 15 Single-Edge-Notched Fracture-Toughness Specimens.

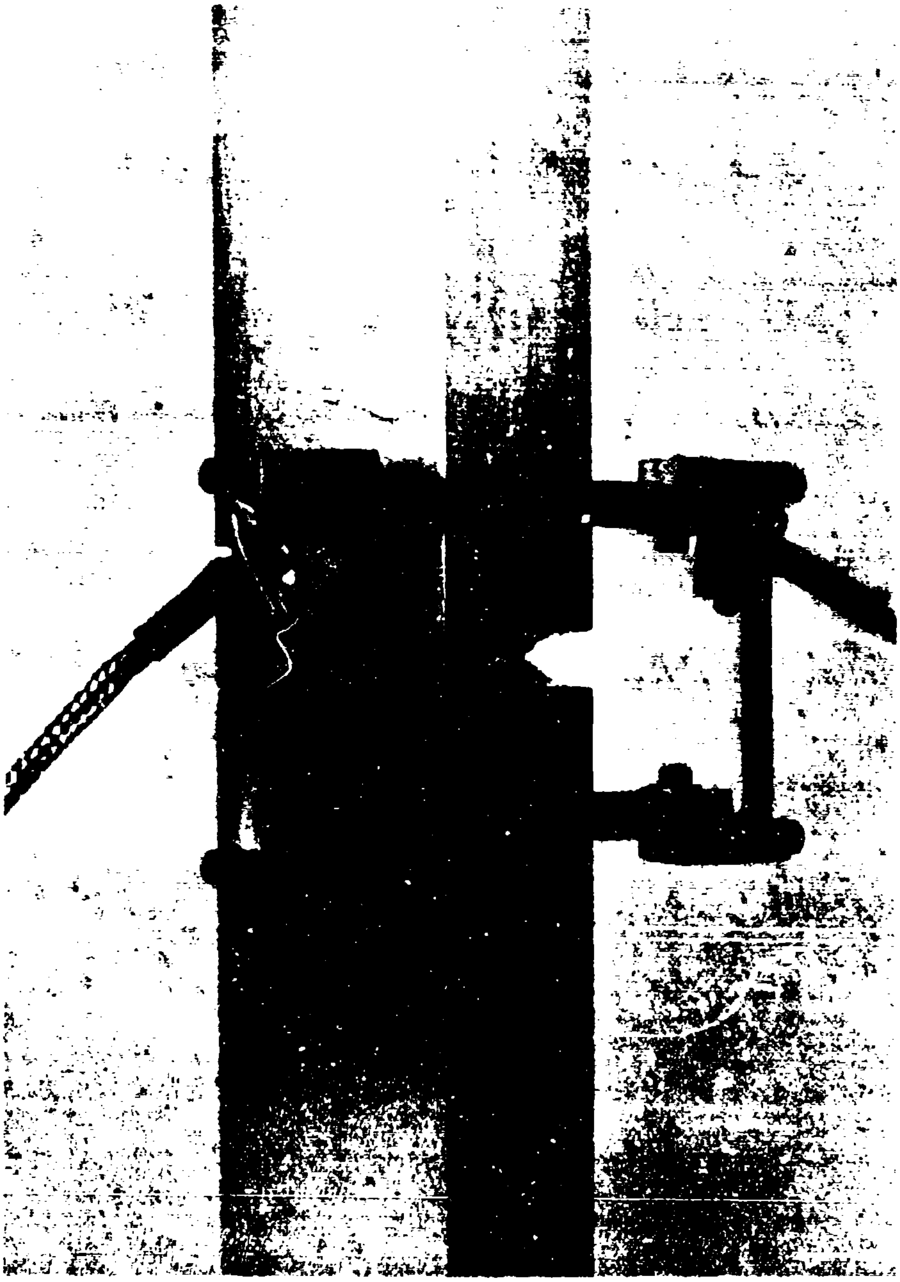


Fig. 16 Strain-Gage Units for Fracture-Toughness Testing

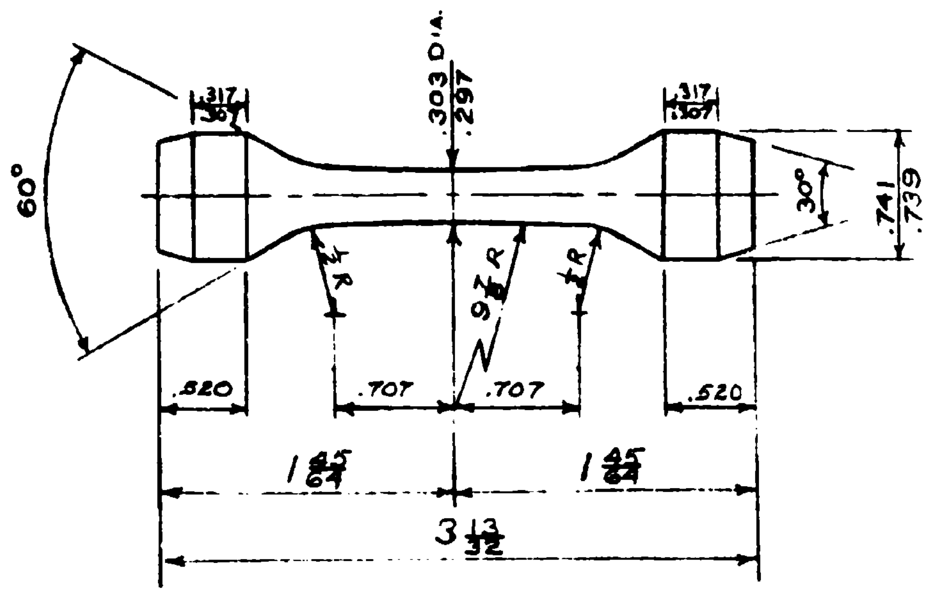
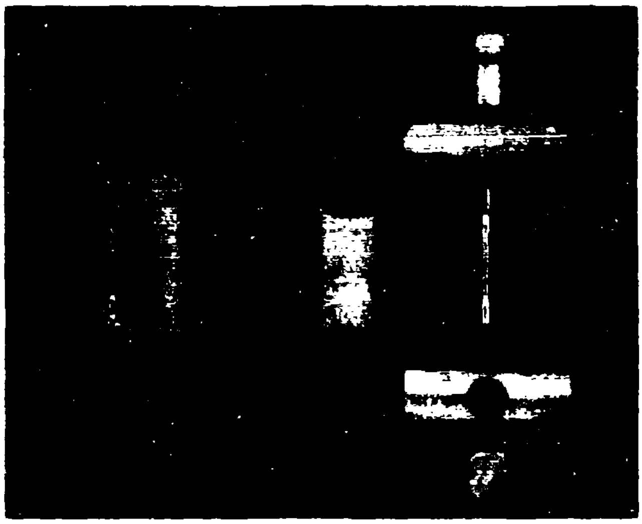


Fig. 17 Axial-Stress Fatigue Specimen



Mag: 1/5X

Fig. 18 Shows the 1/8-in. diameter tensile specimen, the various parts of the stressing frame and the final stressed assembly

Mag: 1/2X

Fig. 19 Synchronous loading device used to stress specimens. A stressed assembly and one assembled finger-tight ready for stressing are shown to the left. Both the stressing frame and the loading device were developed by the Alcoa Research Laboratories, prior to this contract.

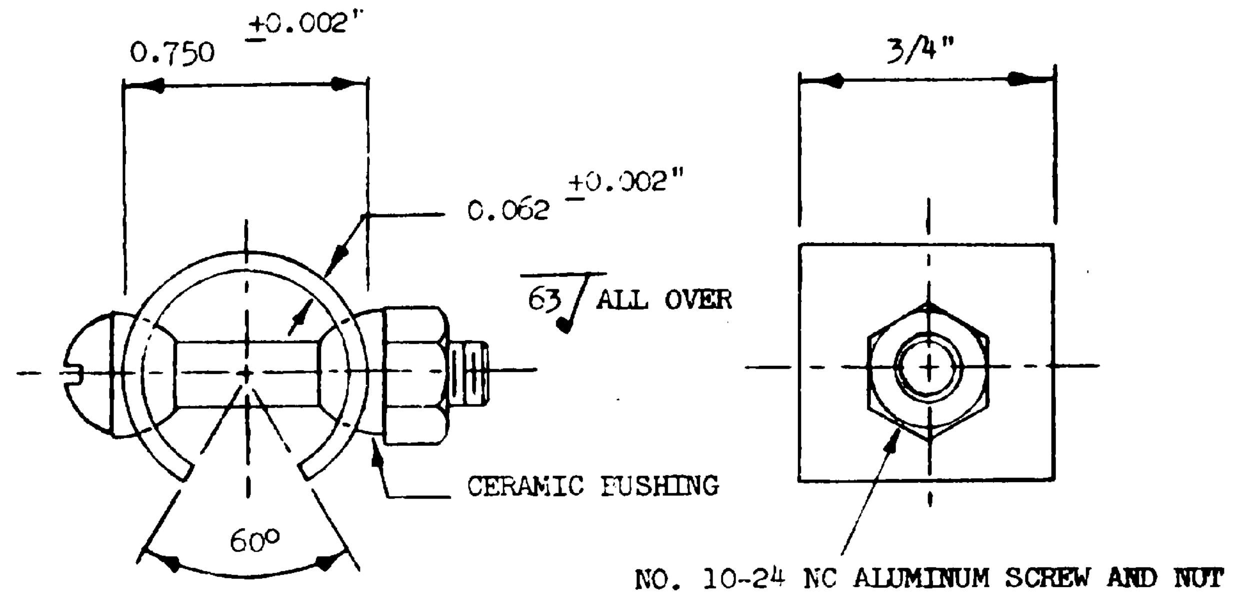


FIGURE 20 C-RING ASSEMBLY FOR SHORT-TRANSVERSE STRESS-CORROSION TESTS

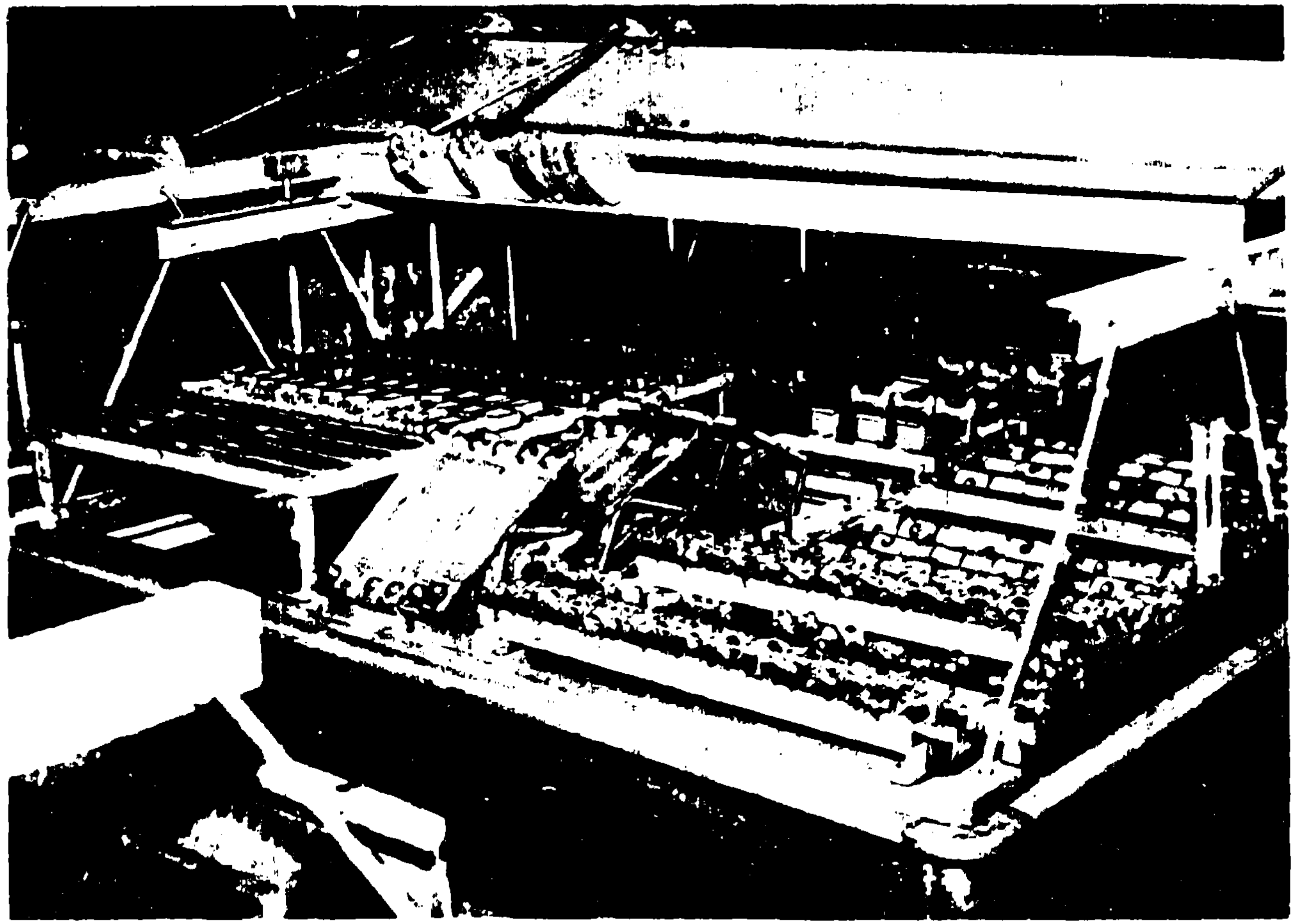


Fig. 21 Equipment for Alternate Immersion Corrosion Tests

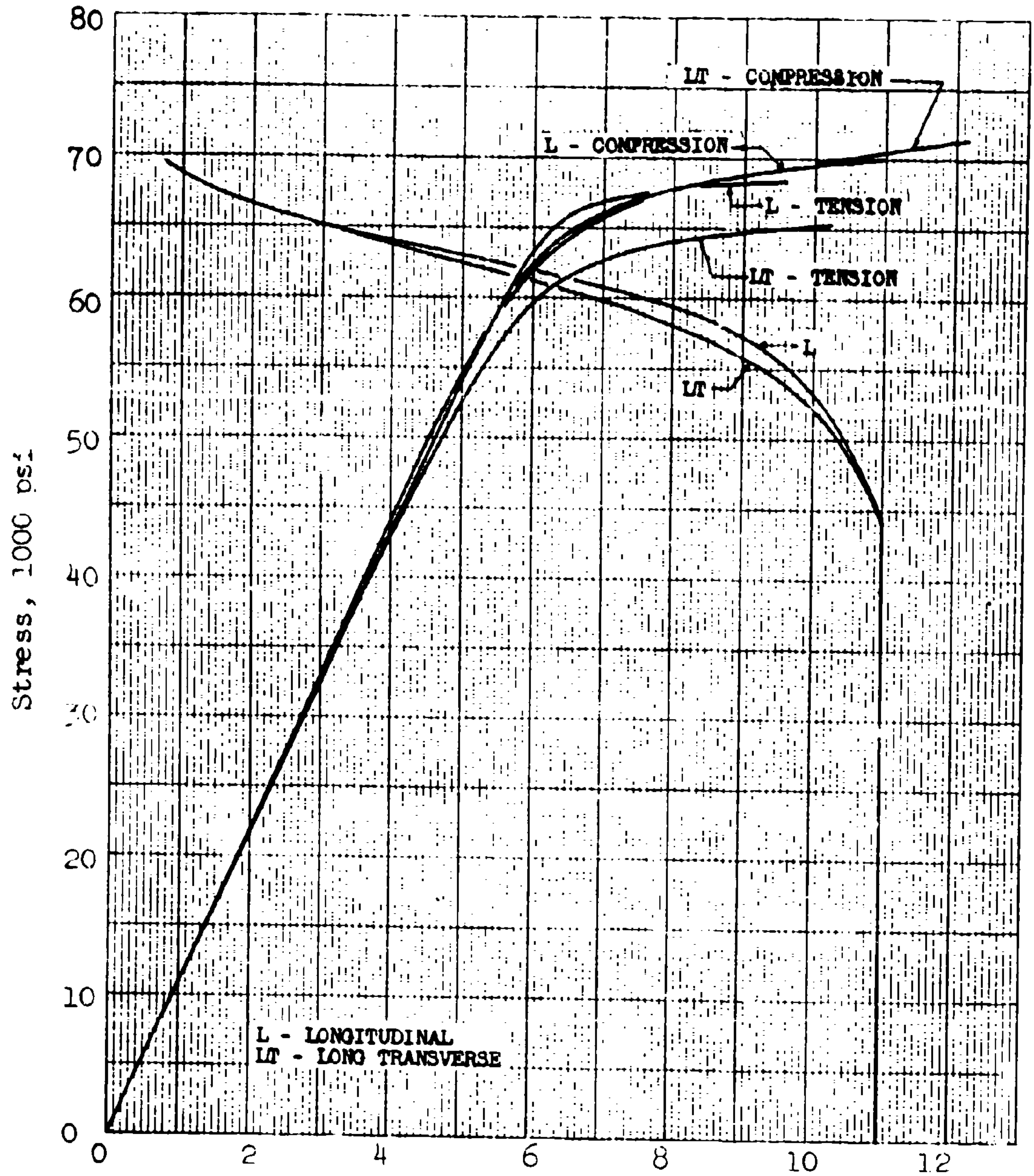


Fig. 22 Typical-Stress-Strain and Tangent-Modulus Curves for 2014-T651X Aluminum Alloy Extrusions, 0.500-0.749-in.

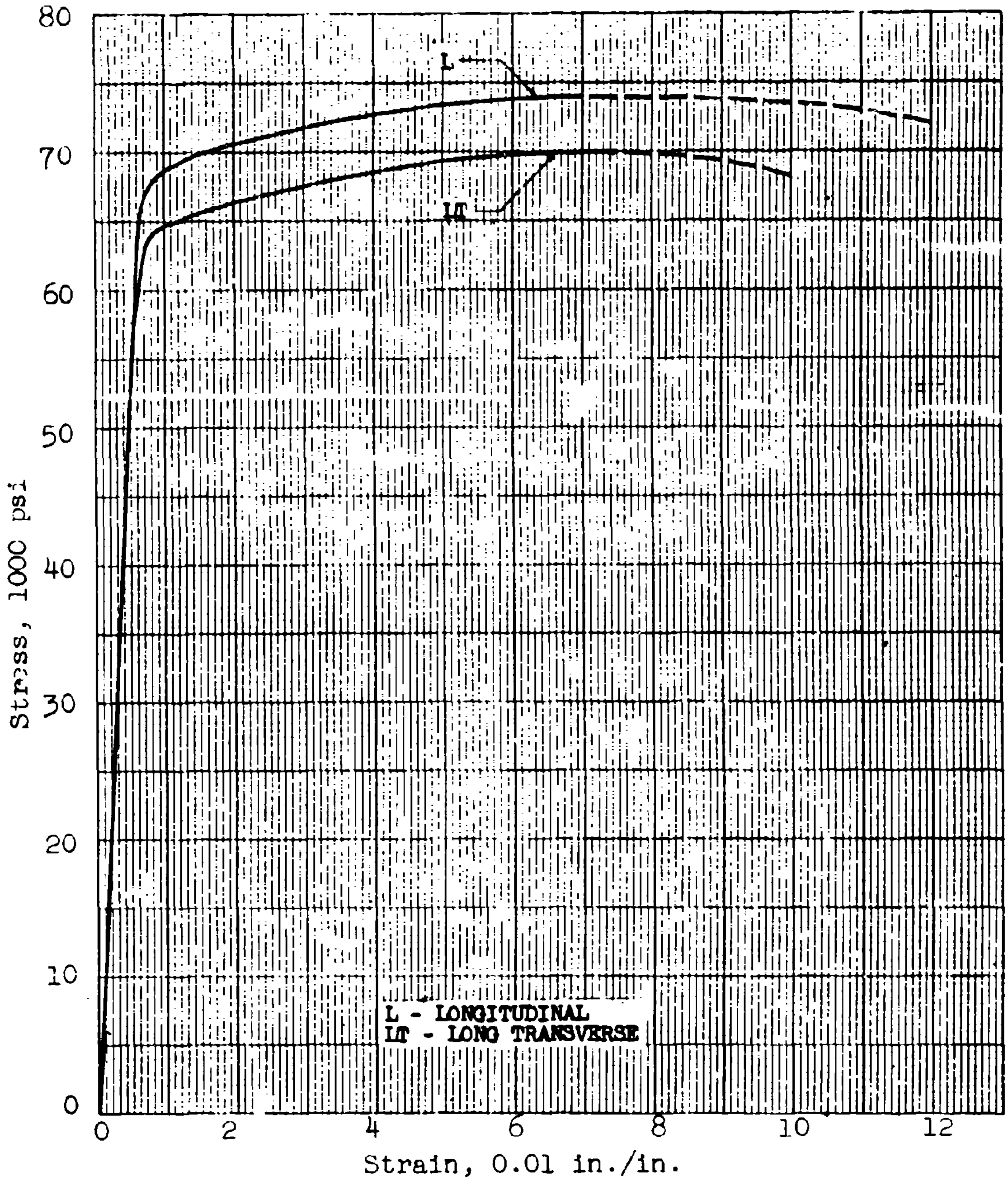


Fig. 23 Typical Tensile Stress-Strain Curves (full range) for 2014-T651X Aluminum Alloy Extrusions, 0.500-0.749 in.

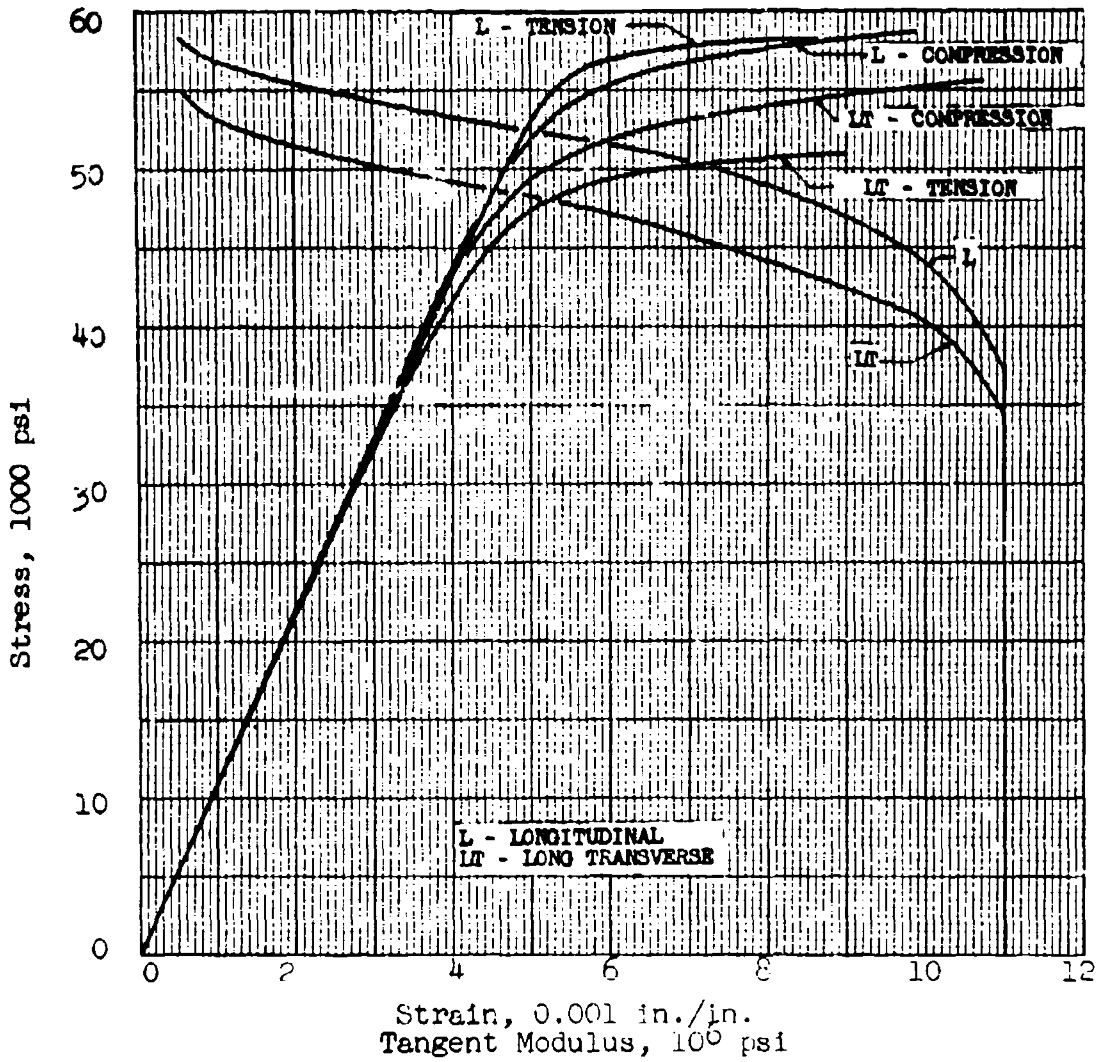
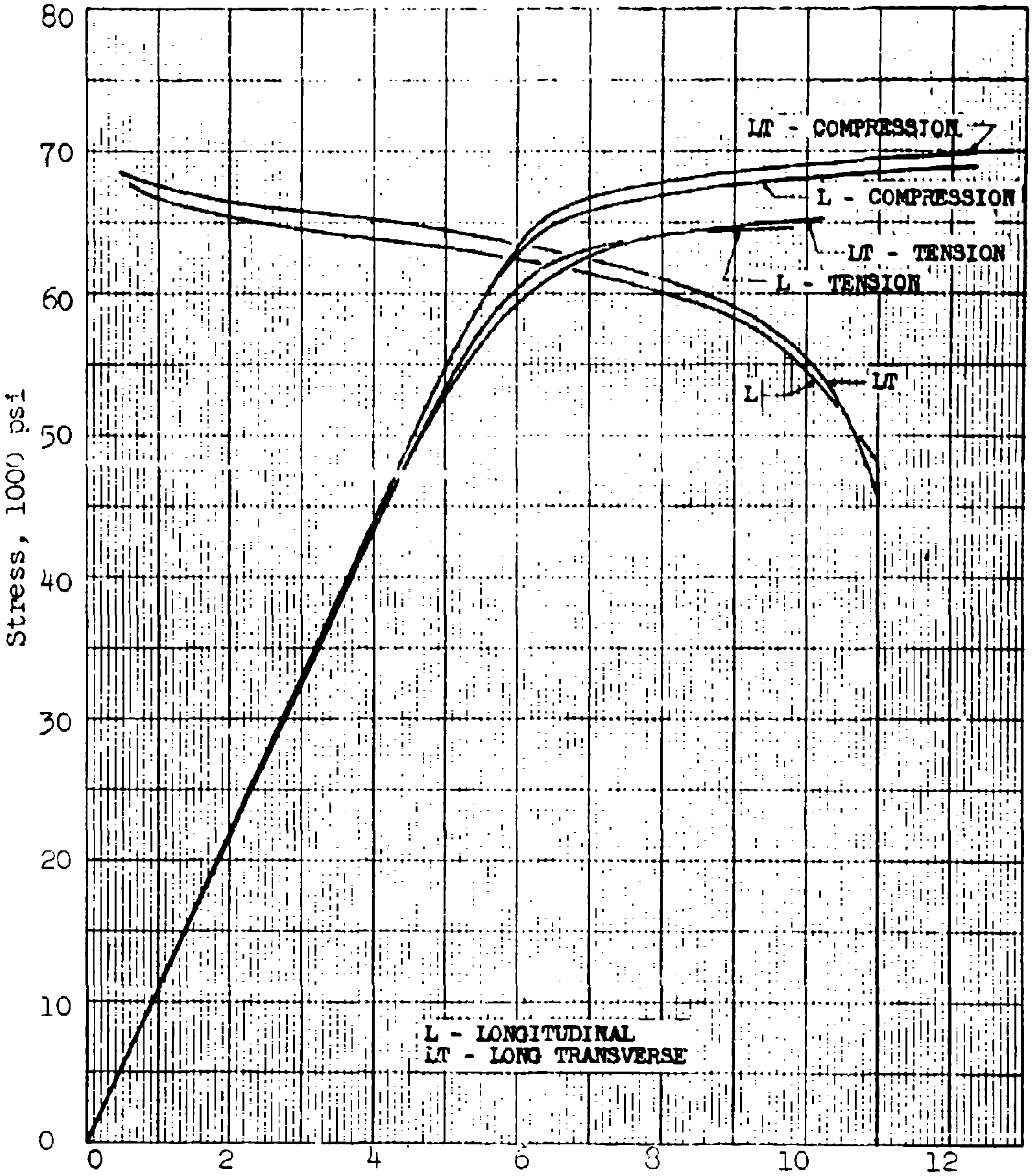


Fig. 24 Minimum ("A" Value) Stress-Strain and Tangent-Modulus Curves for 2014-T651X Aluminum Alloy Extrusions, 0.500-0.749 in.



Strain, 0.001 in./in.
Tangent Modulus, 10^6 psi

Fig.25 Typical Stress-Strain and Tangent-Modulus Curves for 2014-T62 Aluminum Alloy Extrusions, ≤ 0.499 in. (Heat-Treated-By-User)

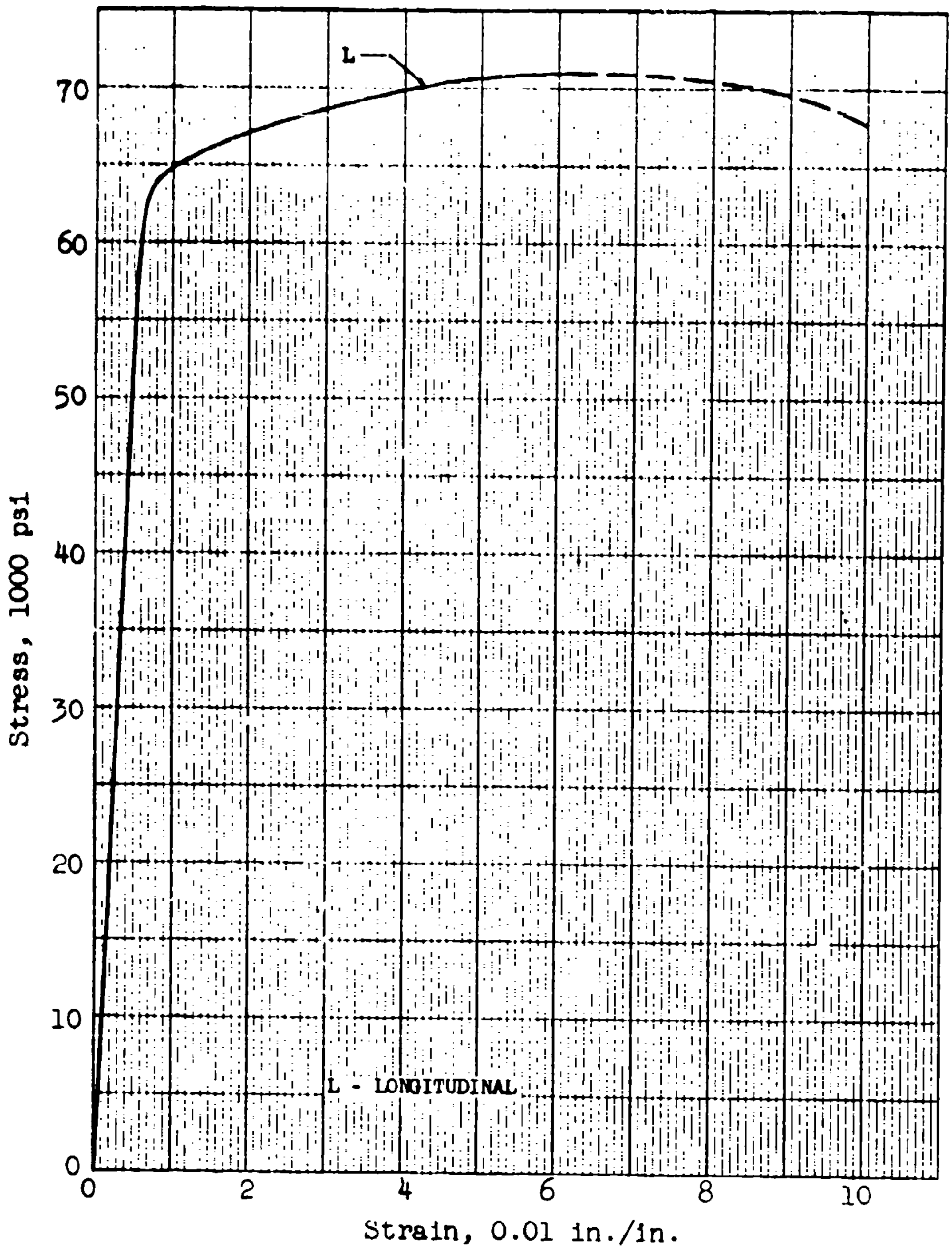


Fig. 26 Typical Tensile Stress-Strain Curve (full range) for 2014-T62 Aluminum Alloy Extrusions, ≥ 0.499 in. (Heat-Treated-By-User)

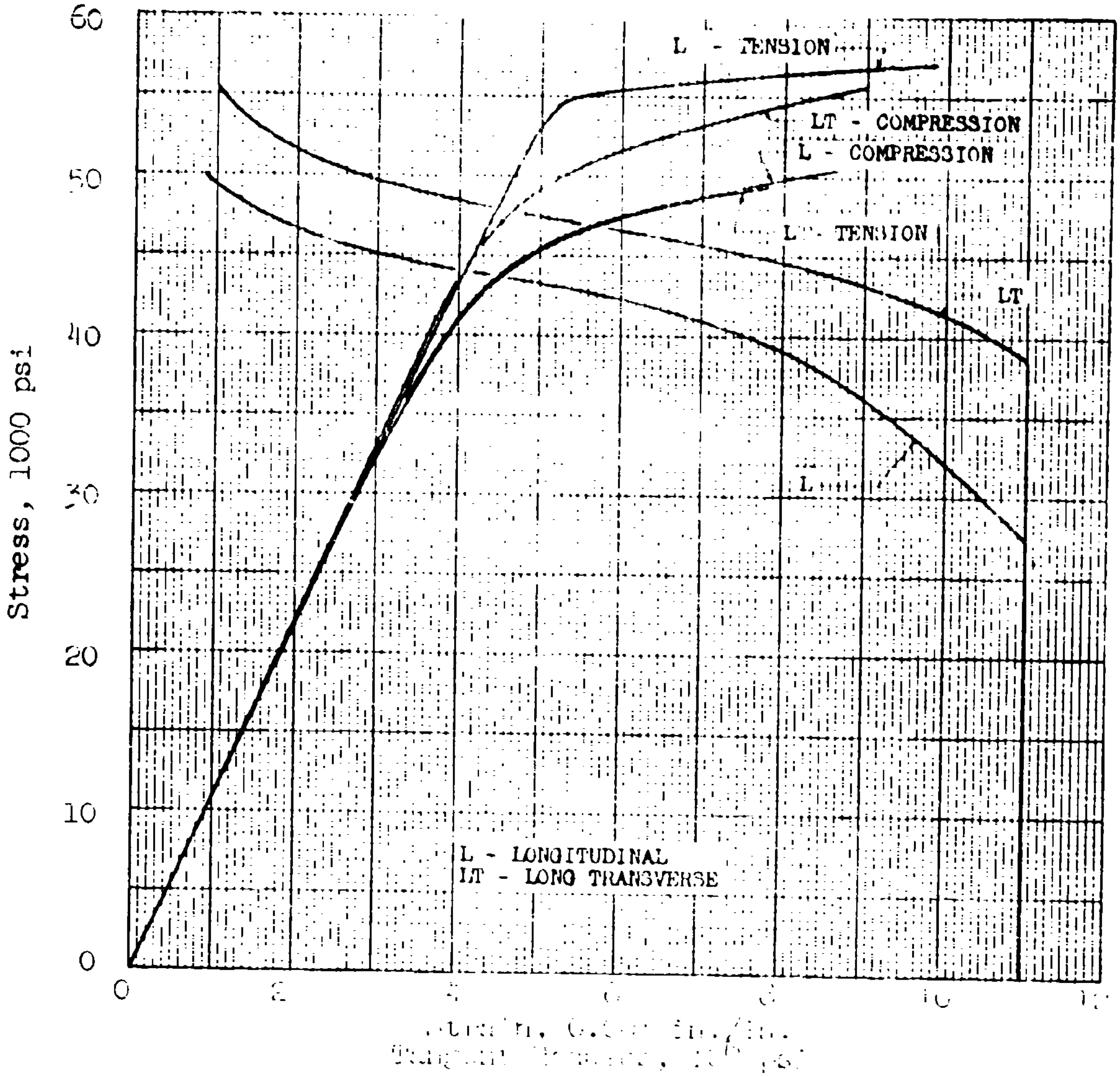


Fig. 27 Typical Stress-Strain and Tangent-Modulus Curves for 2024-T351X Aluminum Alloy Extrusions, 0.[illegible]50-0.749 in.

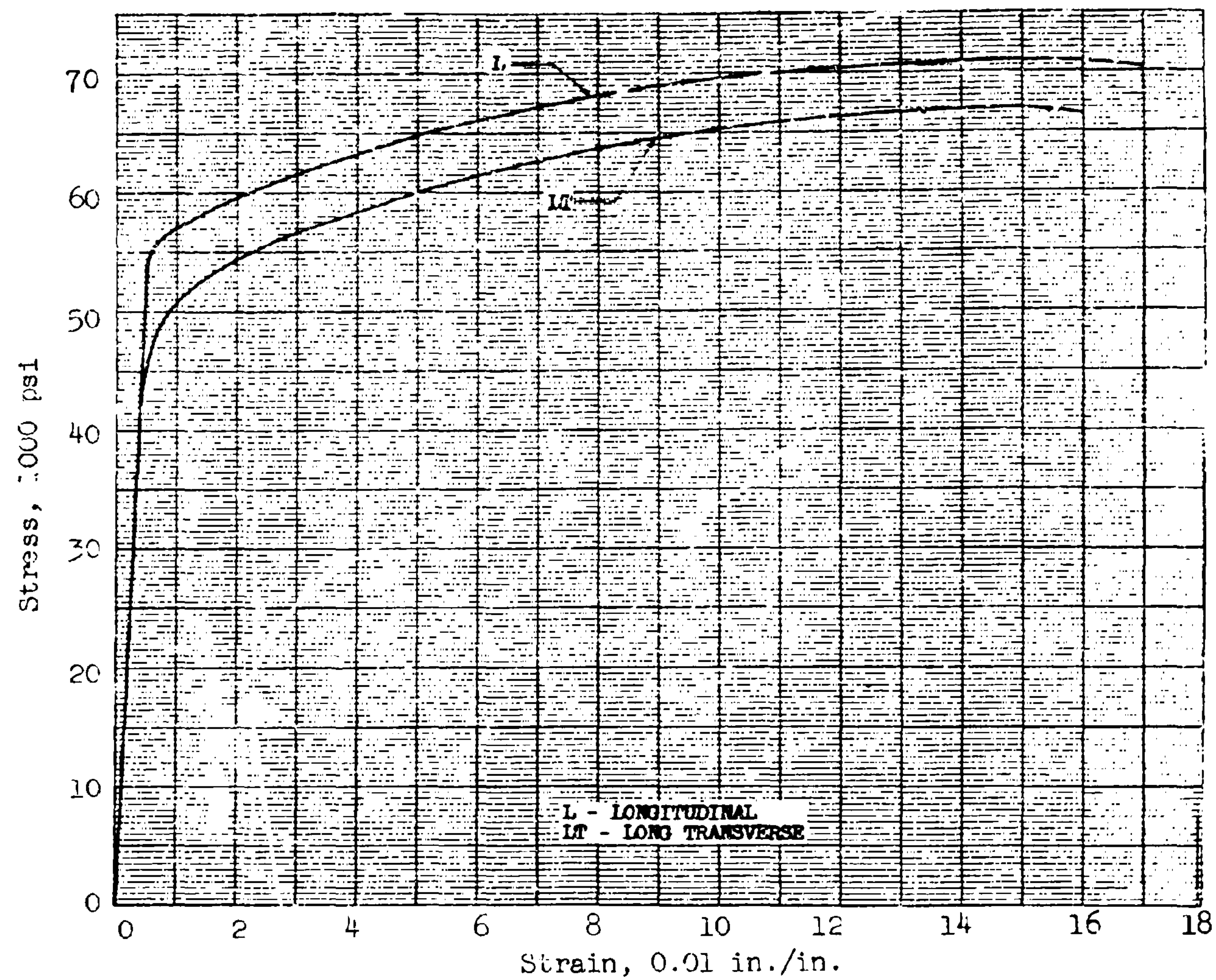


Fig. 28 Typical Tensile Stress-Strain Curves (full range) for 2024-T351X Aluminum Alloy Extrusions, 0.250-0.749 in.

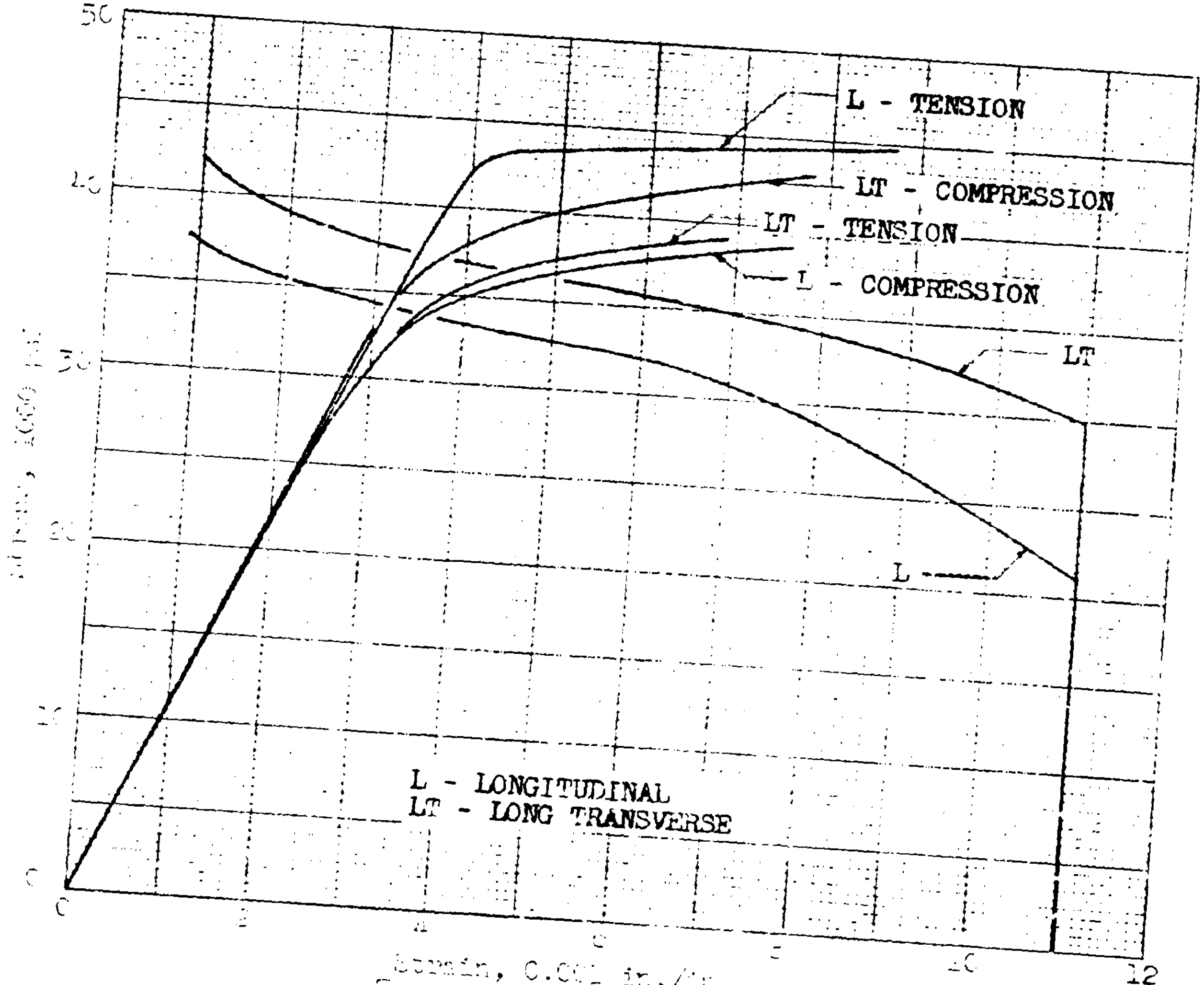


Fig. 29 Minimum ("A" Value) Stress-Strain and Tangent-Modulus Curves for 2024-T81X Aluminum Alloy Extrusions, 0.250-0.499 in.

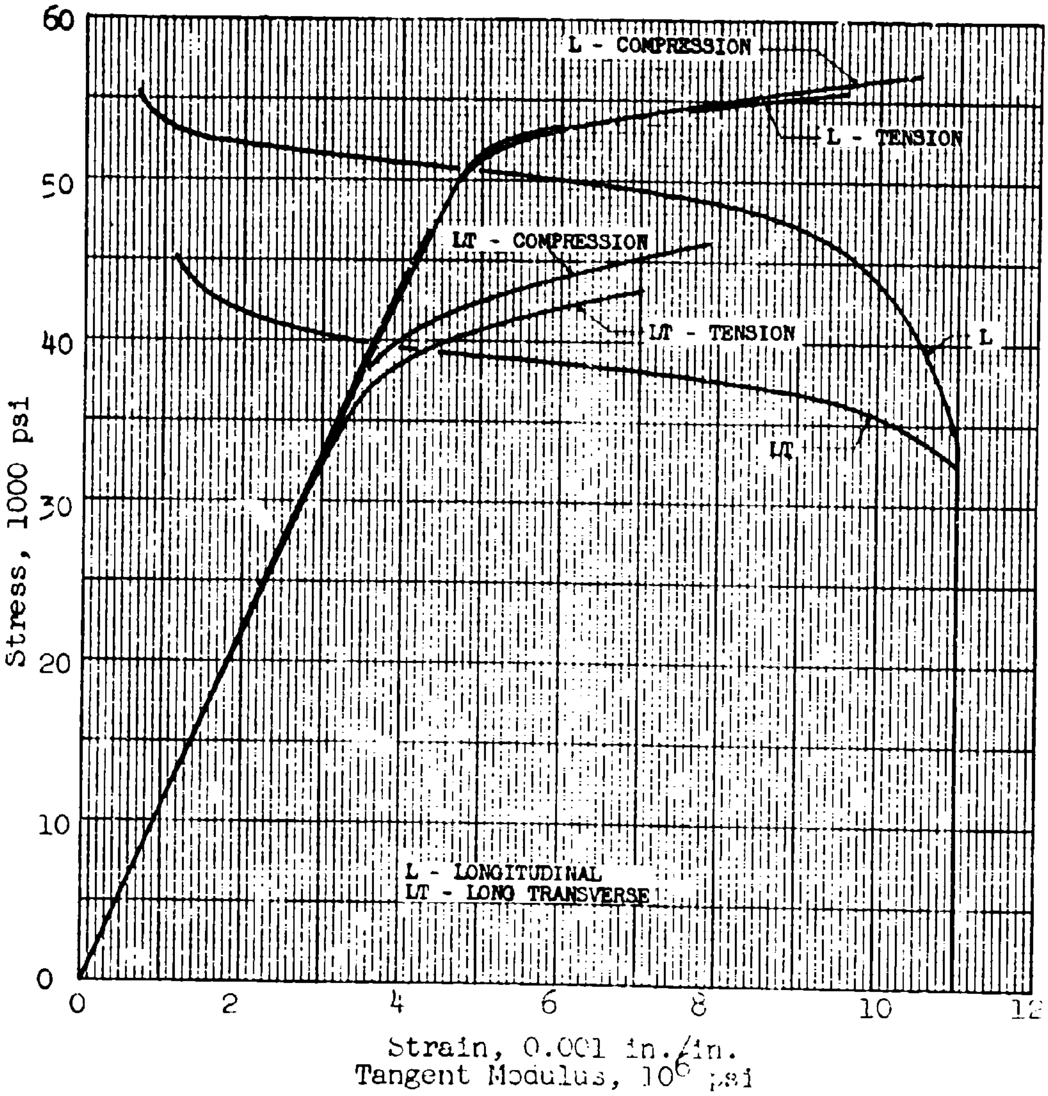


Fig. 30 Typical Stress-Strain and Tangent-Modulus Curves for 2024-T42 Aluminum Alloy Extrusions, ≤1.500 in. (Heat-Treated-By-User)

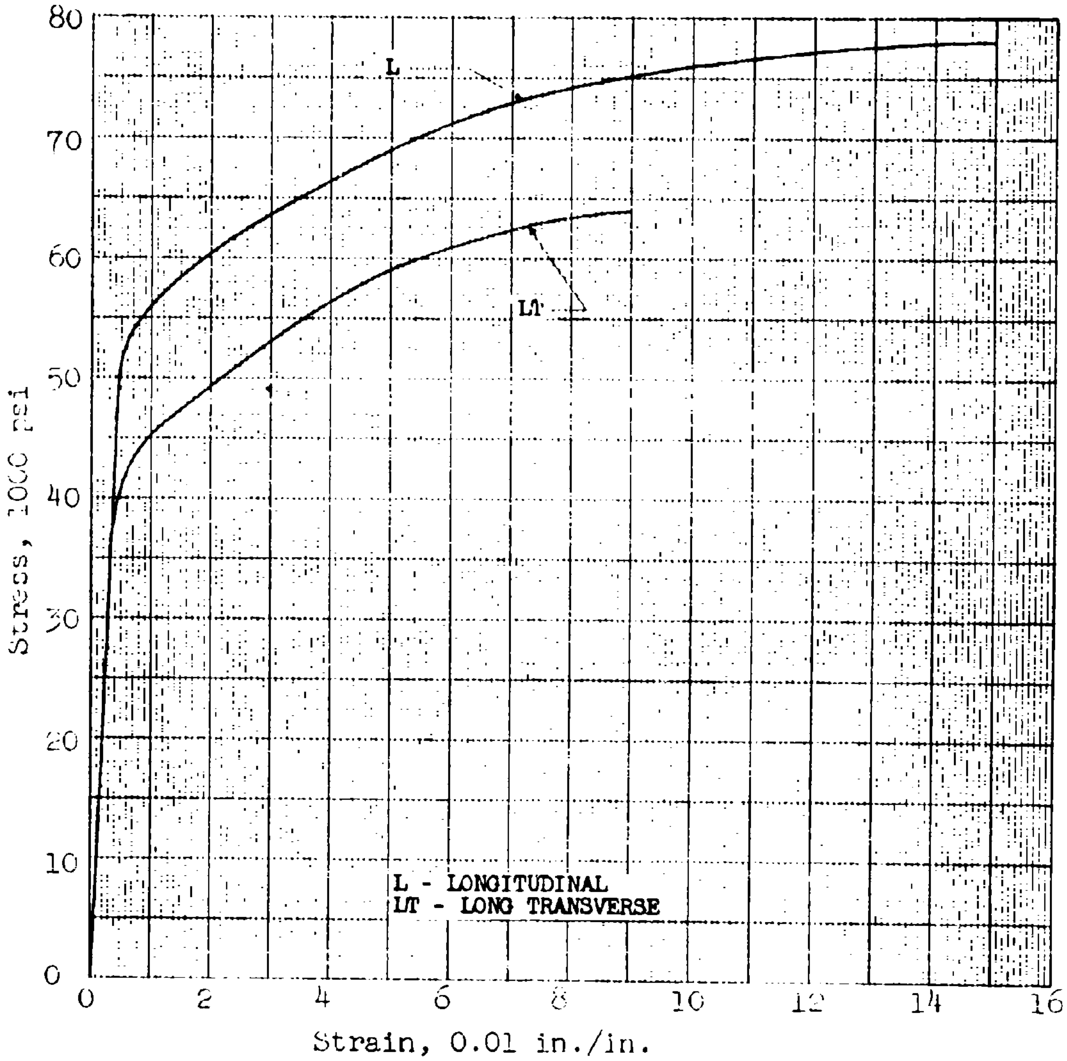


Fig. 31 Typical Tensile Stress-Strain Curves (full range) for 2024-T42 Aluminum Alloy Extrusions, ≥ 1.500 in. (Heat-Treated-By-User)

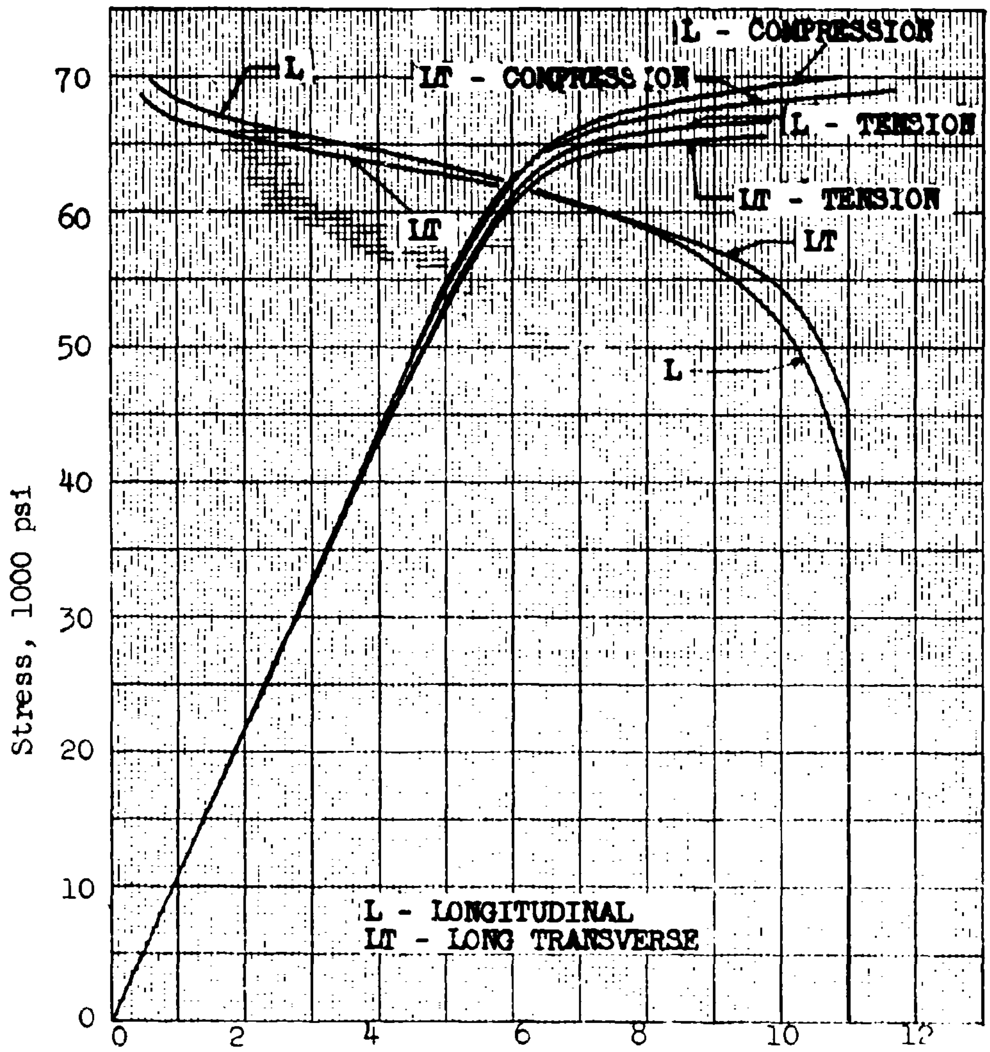


Fig. 32 Typical Stress-Strain and Tangent-Modulus Curves for 2024-T851X Aluminum Alloy Extrusions, 0.250-1.499 in.

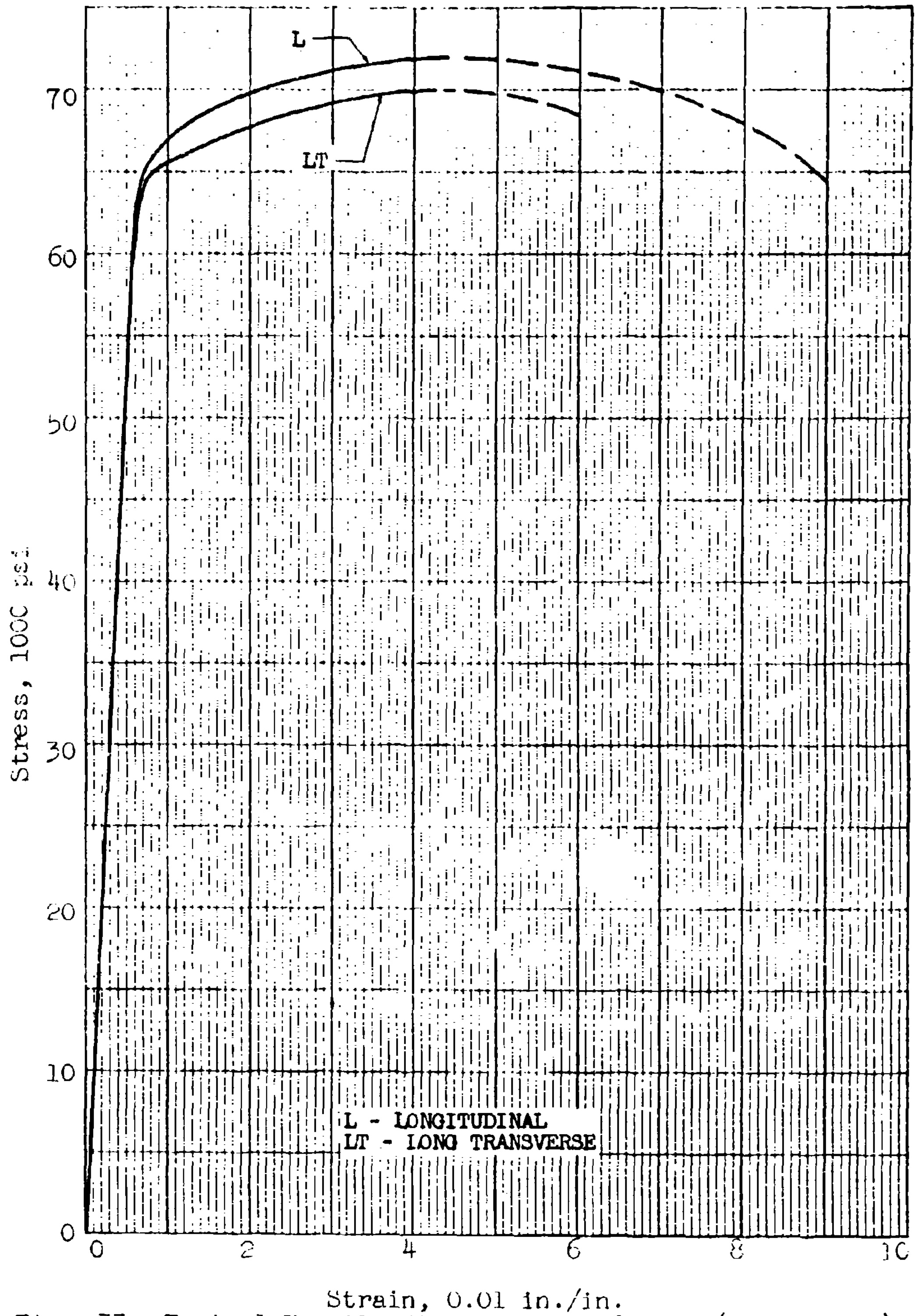


Fig. 33 Typical Tensile Stress-Strain Curves (full range) for 2024-T851X Aluminum Alloy Extrusions, 0.250-0.499 in.

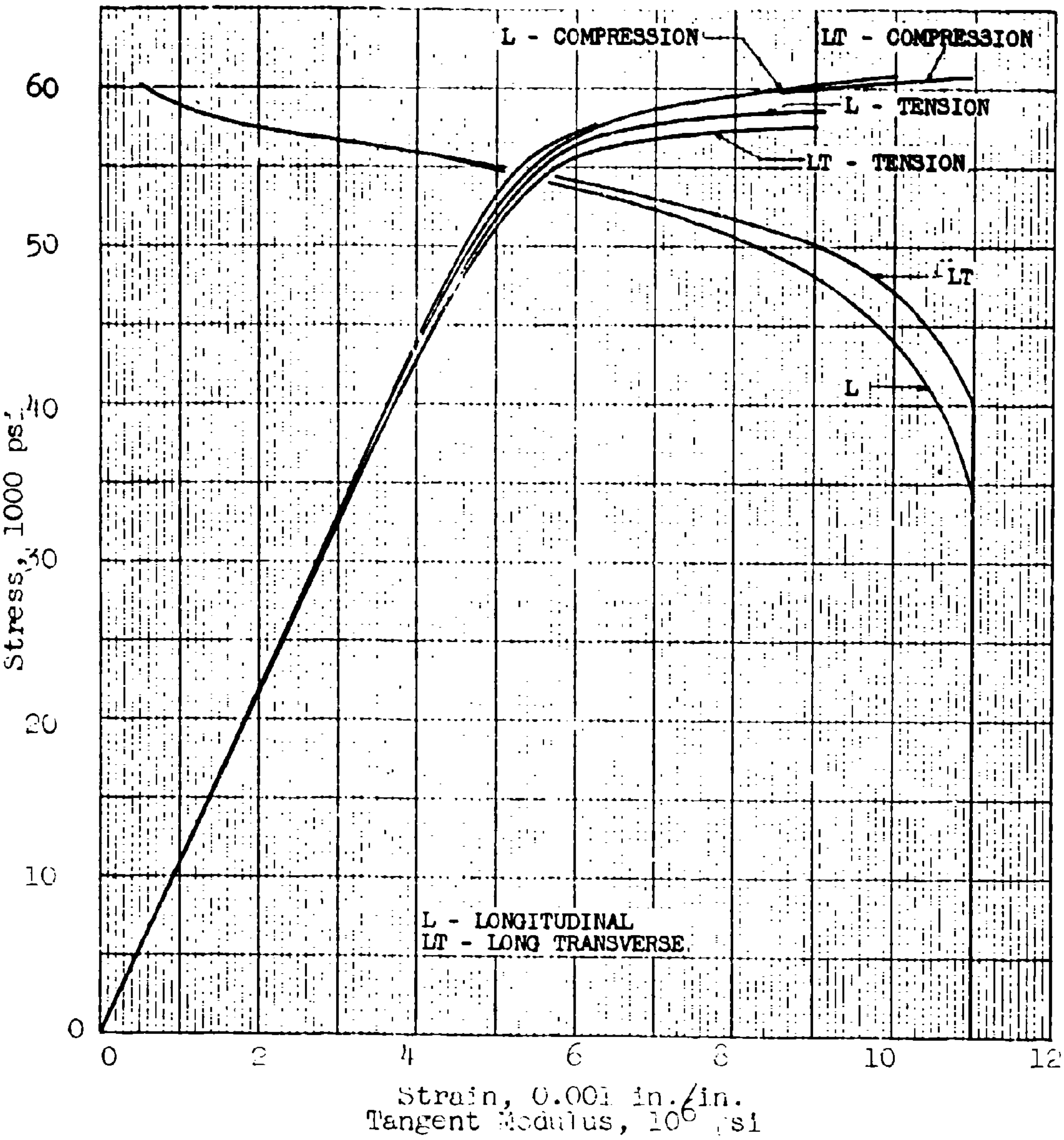


Fig. 34 Minimum ("S" Value) Stress-Strain and Tangent-Modulus Curves for 2024-T851X Aluminum Alloy Extrusions, 0.250-1.499 in.

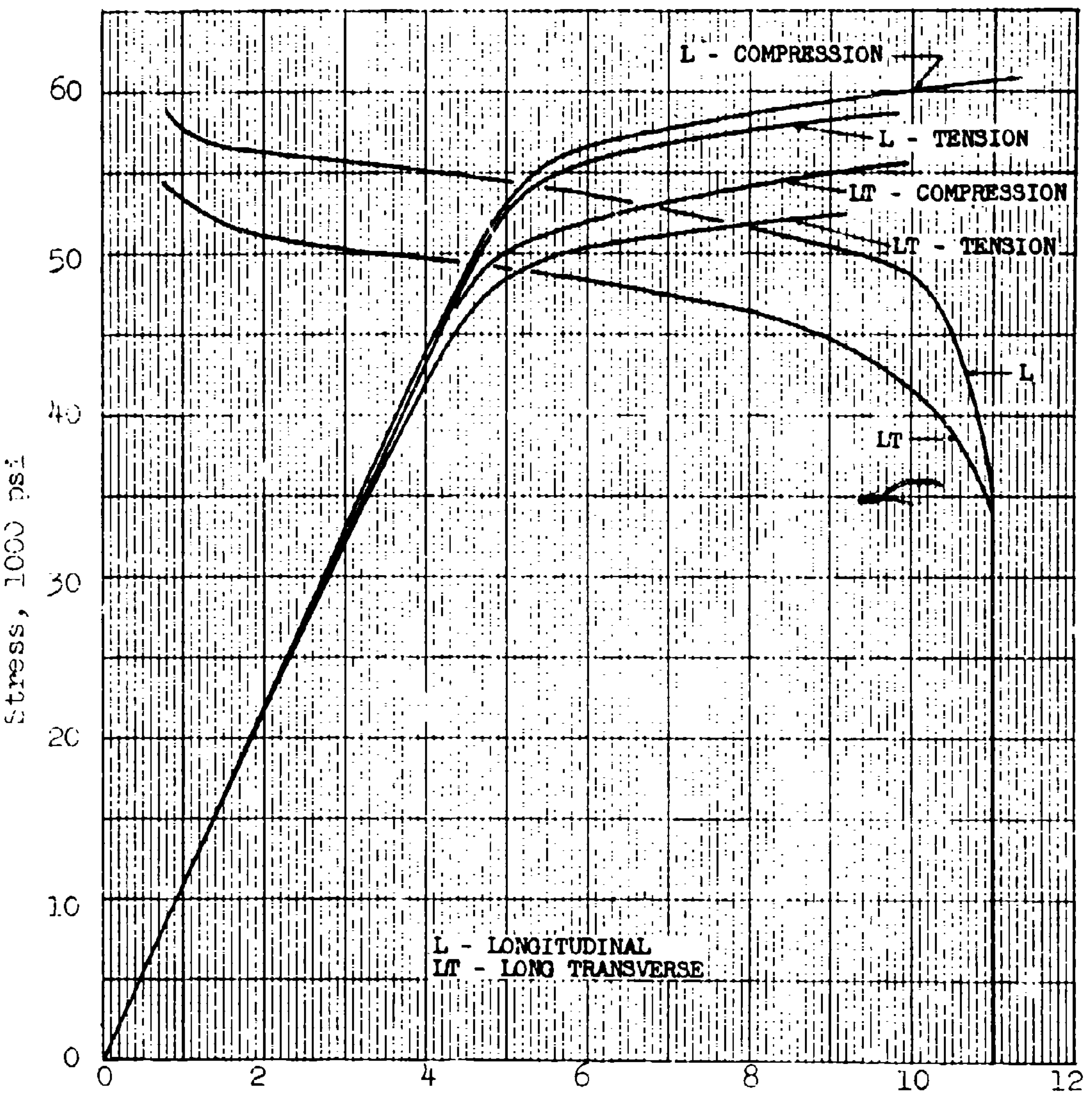


Fig. 35 Typical Stress-Strain and Tangent-Modulus Curves for 2024-T62 Aluminum Alloy Extrusions, = 1.500 in. (Heat-Treated-By-User)

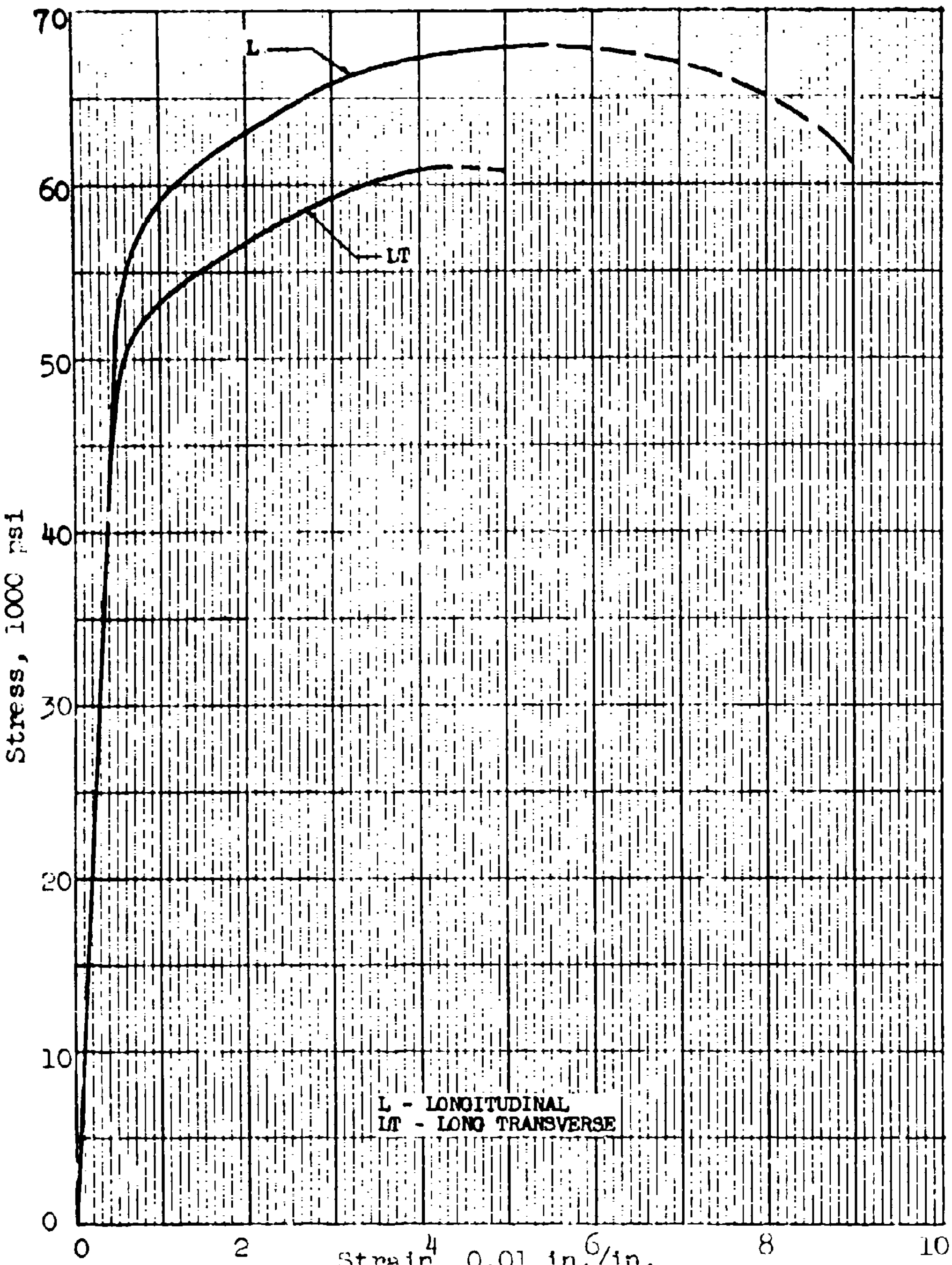


Fig. 36 Typical Tensile Stress-Strain Curves (full range) for 2024-[illegible] Aluminum Alloy Extrusions, [illegible]1.500 in. (Heat-Treated-By-User)

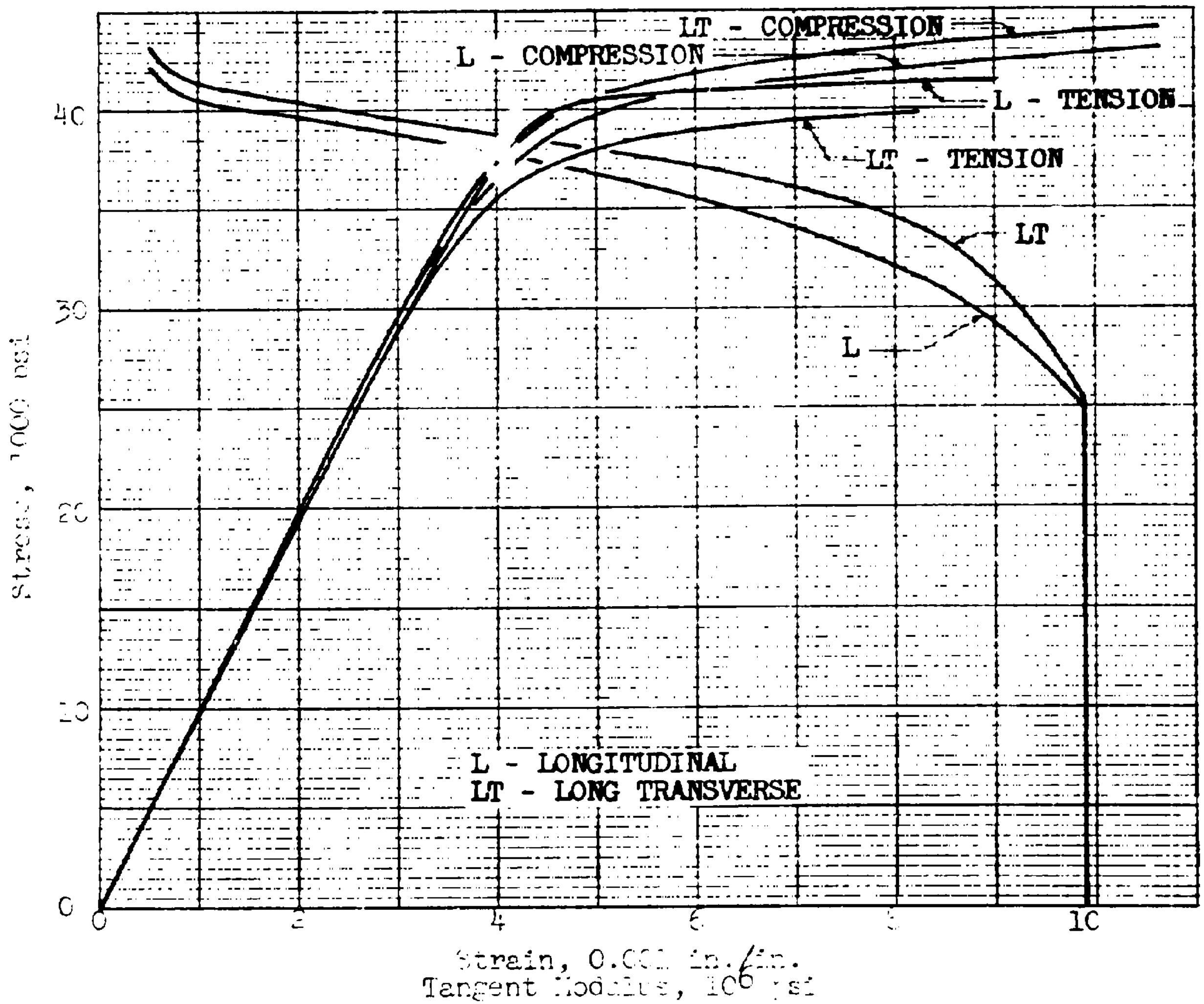


Fig. 37 Typical Stress-Strain and Tangent Modulus Curves for 6061-T651X Aluminum Alloy Extrusions, ≤ 0.499 in.

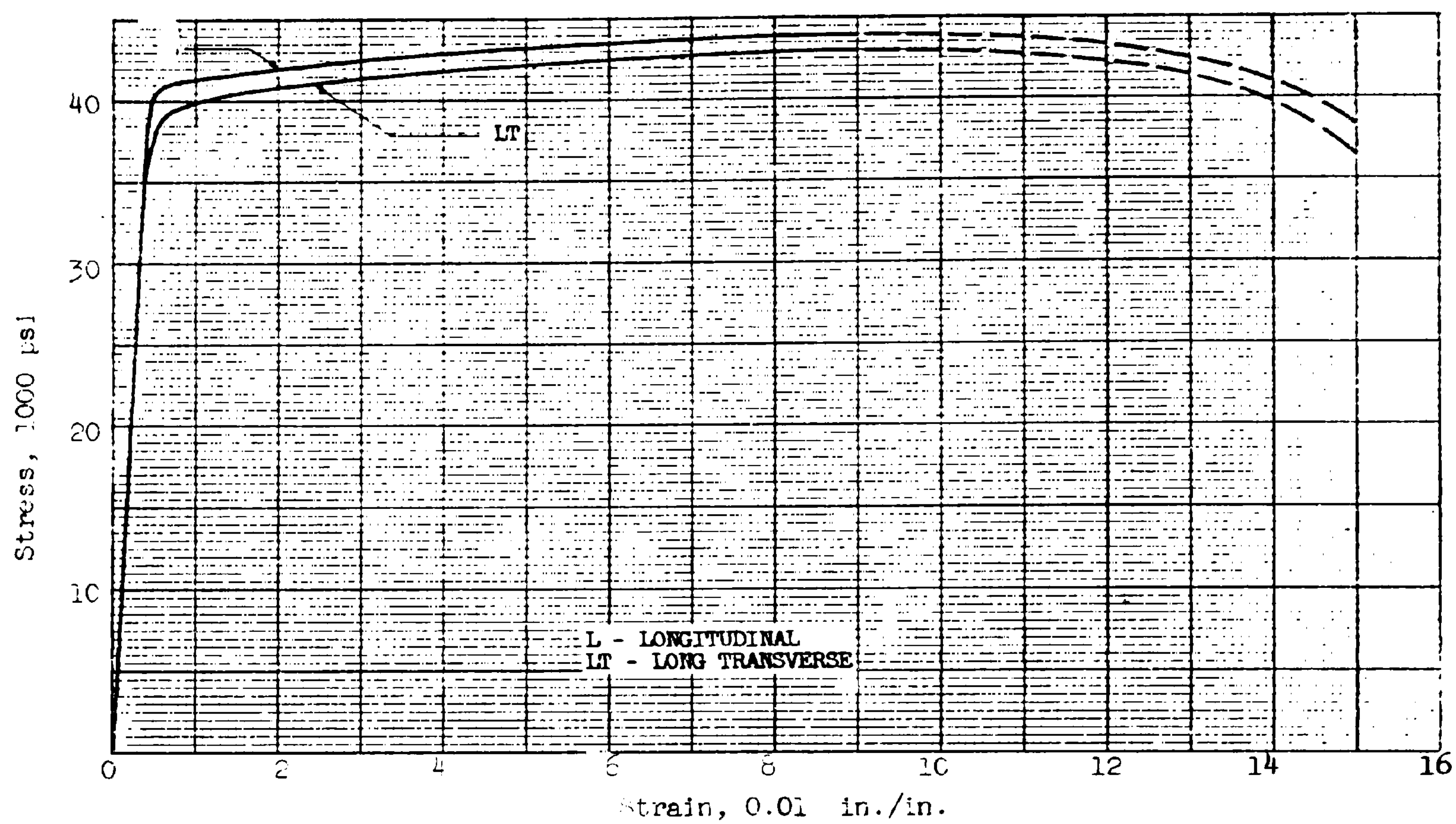


Fig. 38 Typical Tensile Stress-Strain Curves (full range) for 6061-T6[illegible]X Aluminum Alloy Extrusions, ≥0.499 in.

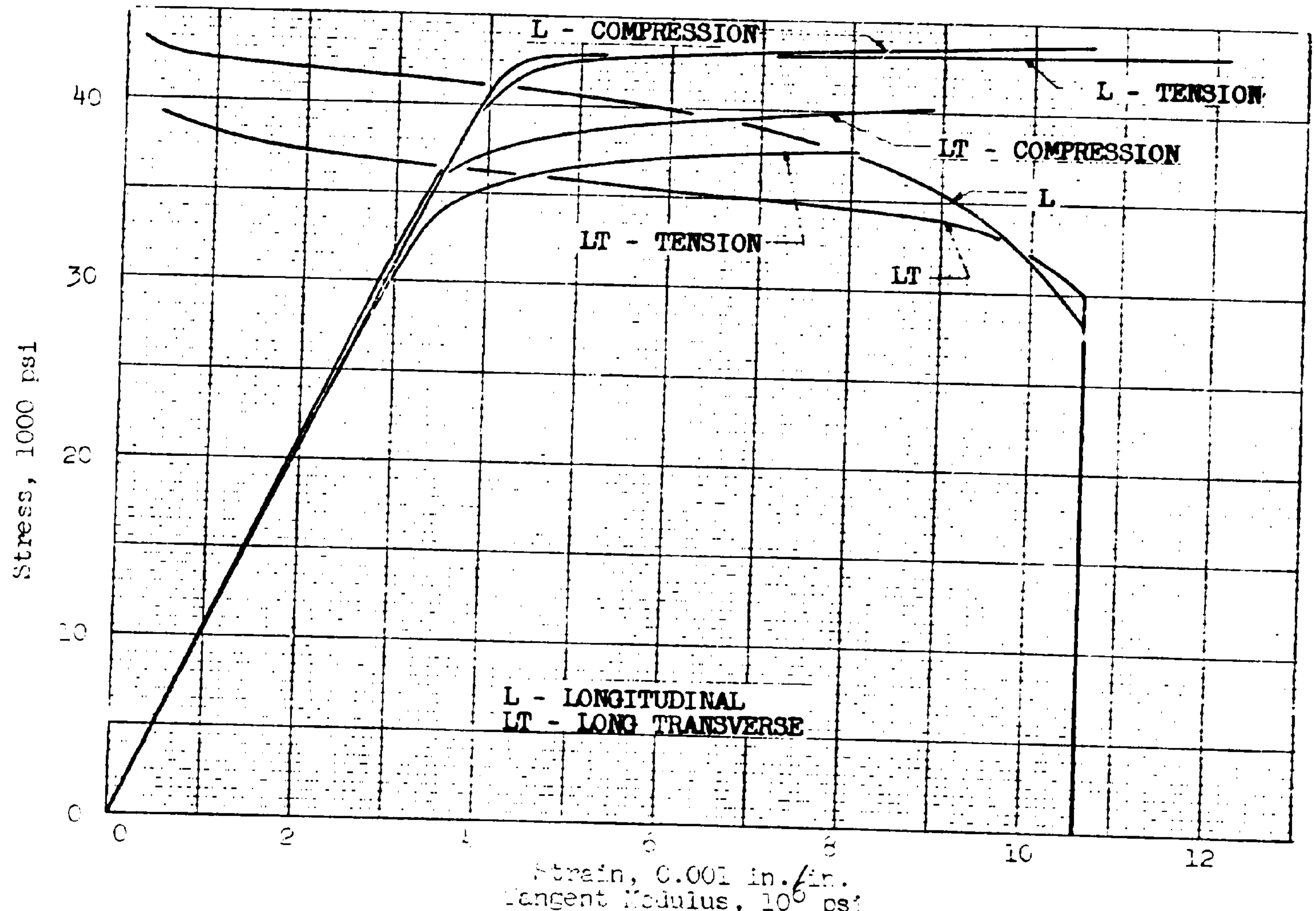


Fig. 39 Typical Stress-Strain and Tangent-Modulus Curves for 6061-T651X Aluminum Alloy Extrusions, ≤ 3.000 in.

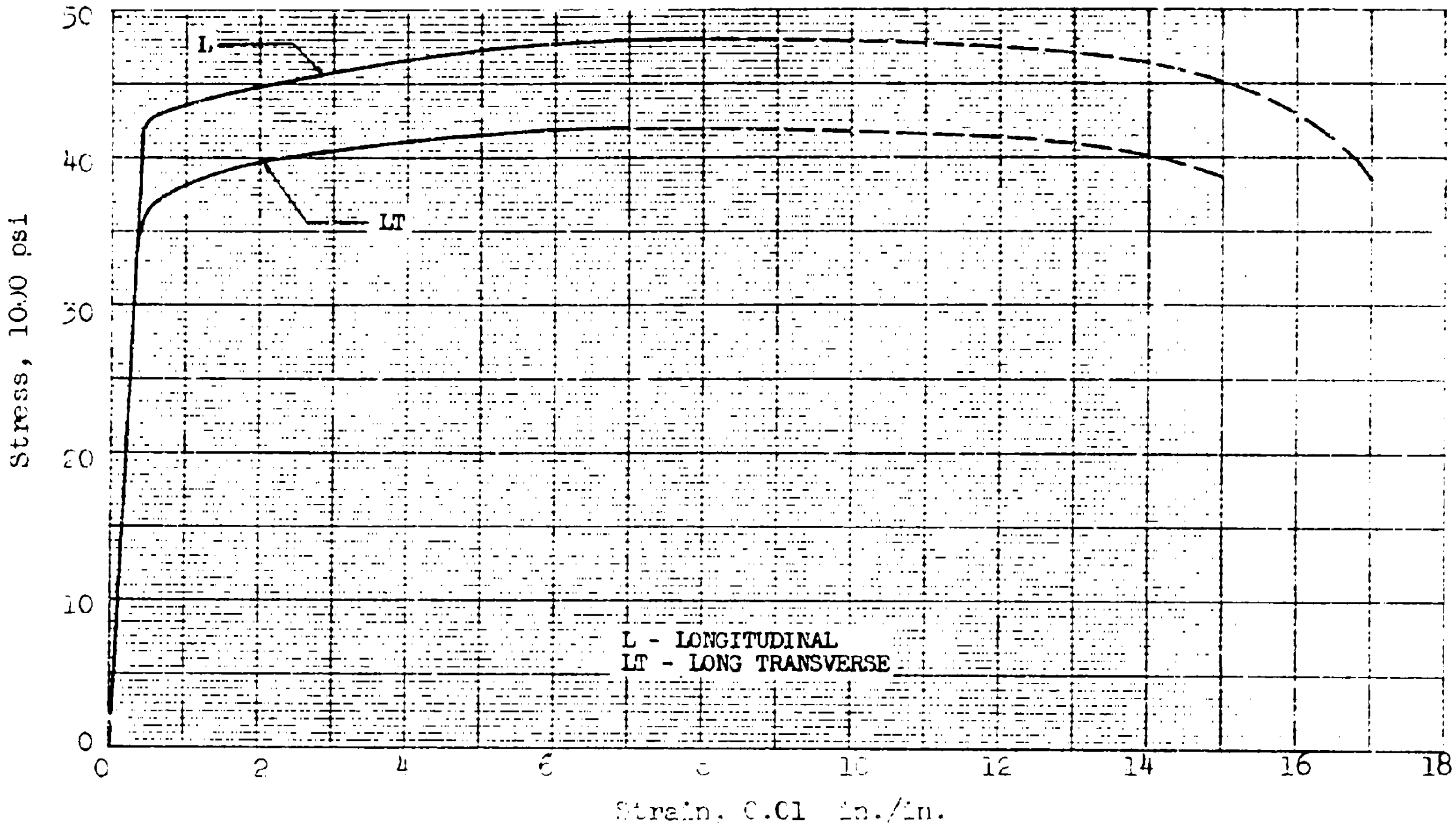


Fig. 40 Typical Tensile Stress Curves (full range) for 6061-T651X Aluminum Alloy Extrusions, ≥3.000 in.

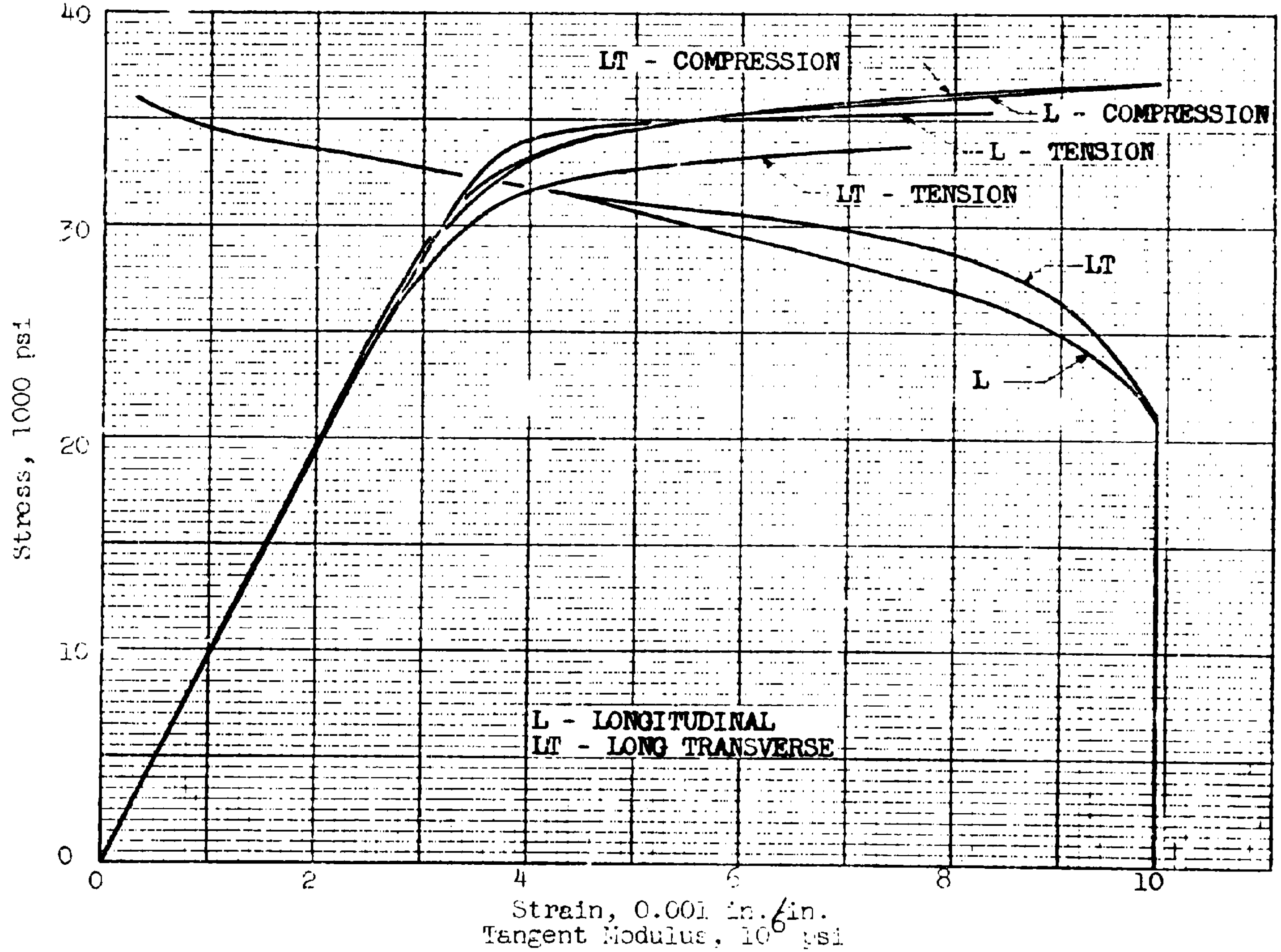


Fig. 41 Minimum ("A" Value) Stress-Strain and Tangent Modulus-Curves for 6061-T651X Aluminum Alloy Extrusions, ≤ 0.499 in.

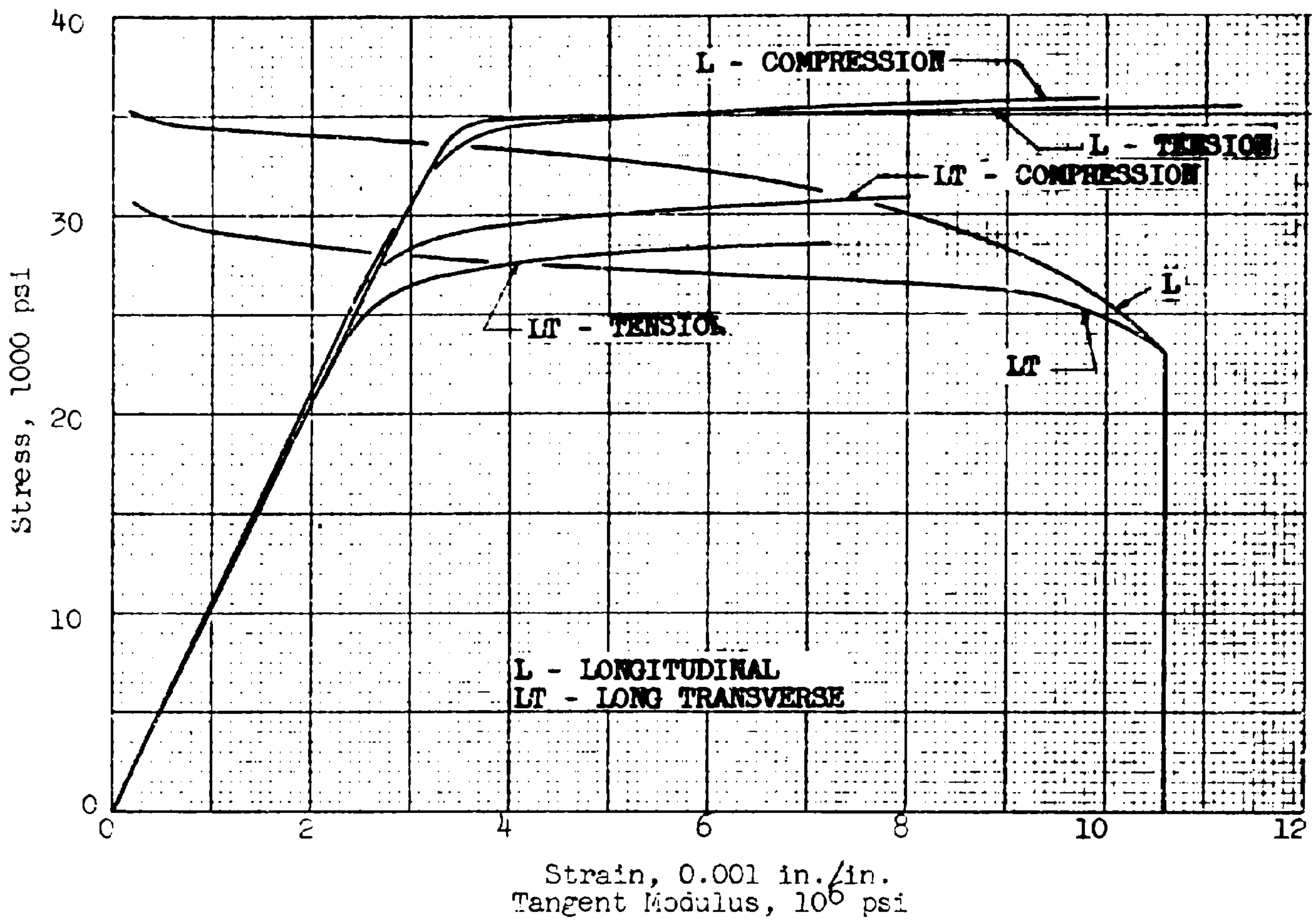


Fig. 42 Minimum ("A" Value) Stress-Strain and Tangent Modulus Curves for 6061-T651X Aluminum Alloy Extrusions, $\leq$ 3.000 in.

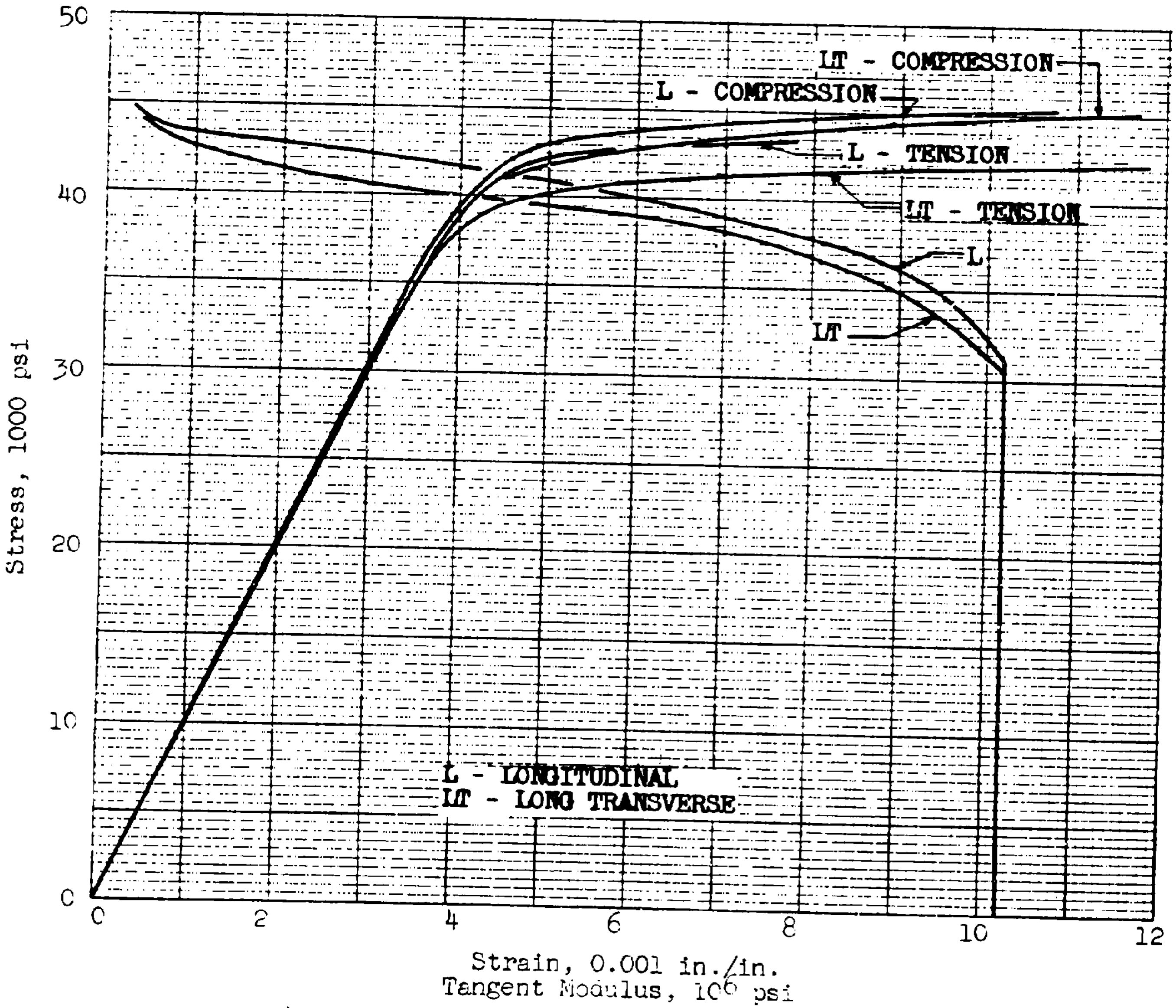


Fig. 43 Typical Stress-Strain and Tangent-Modulus Curves for 6061-T62 Aluminum Alloy Extrusions, All Thicknesses (Heat-Treated-By-User)

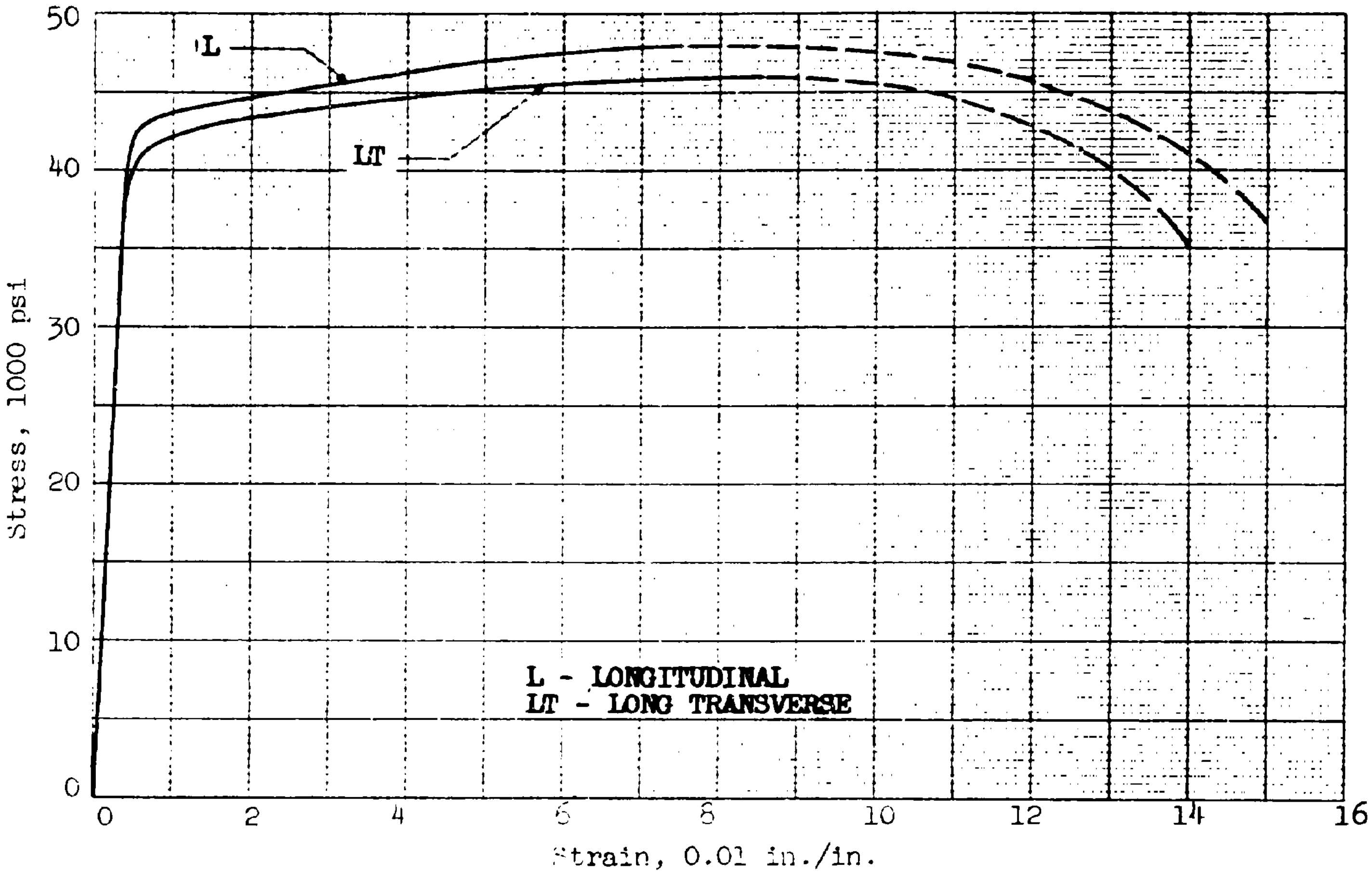


Fig. 44 Typical Stress-Strain Curves (full range) for 6061-T62 Aluminum Alloy Extrusions, All Thicknesses (Heat-Treated-By-User)

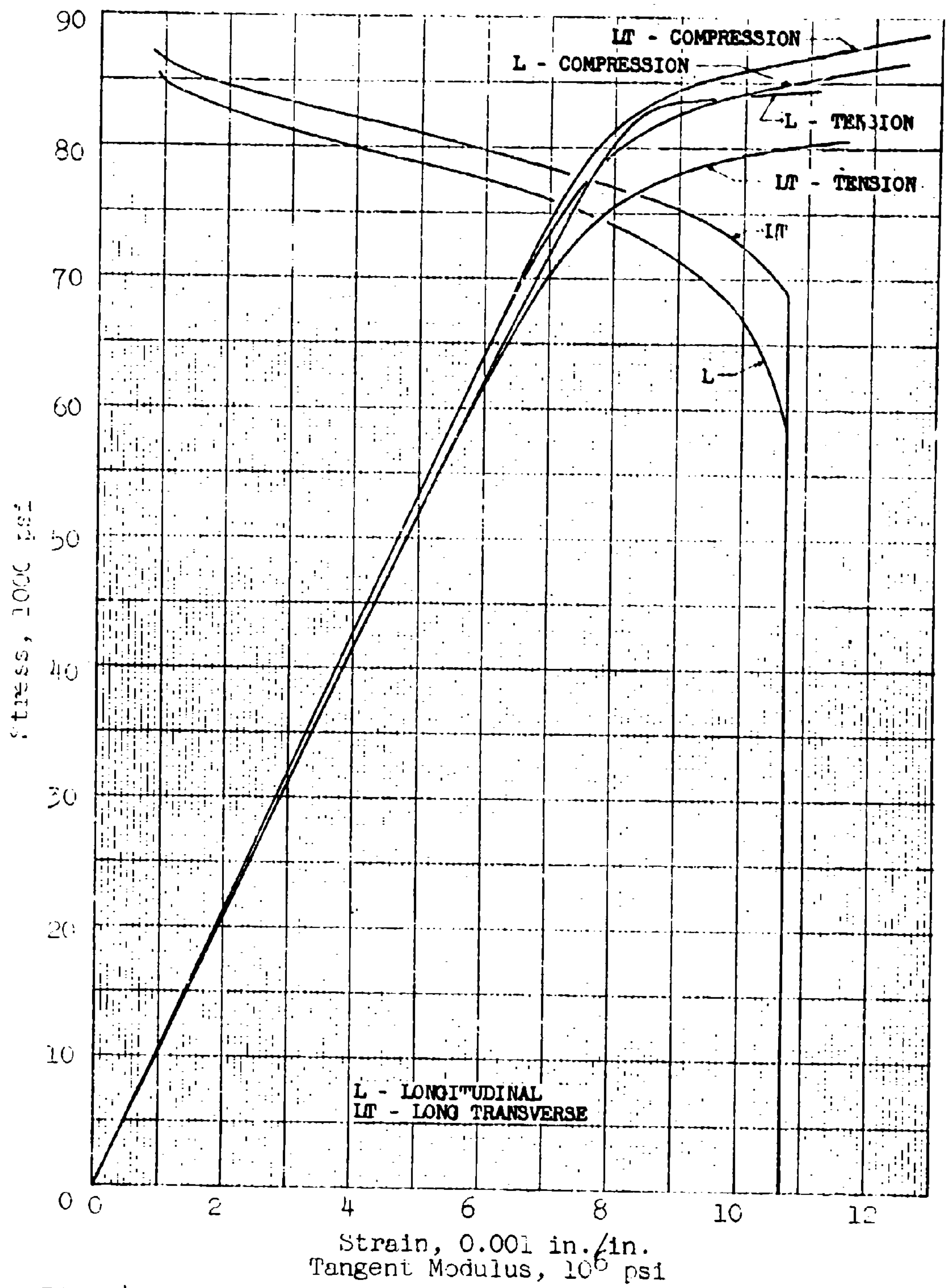


Fig. 45 Typical Stress-Strain and Tangent-Modulus Curves for 7075-T651X Aluminum Alloy Extrusions, 0.500-0.749 in.

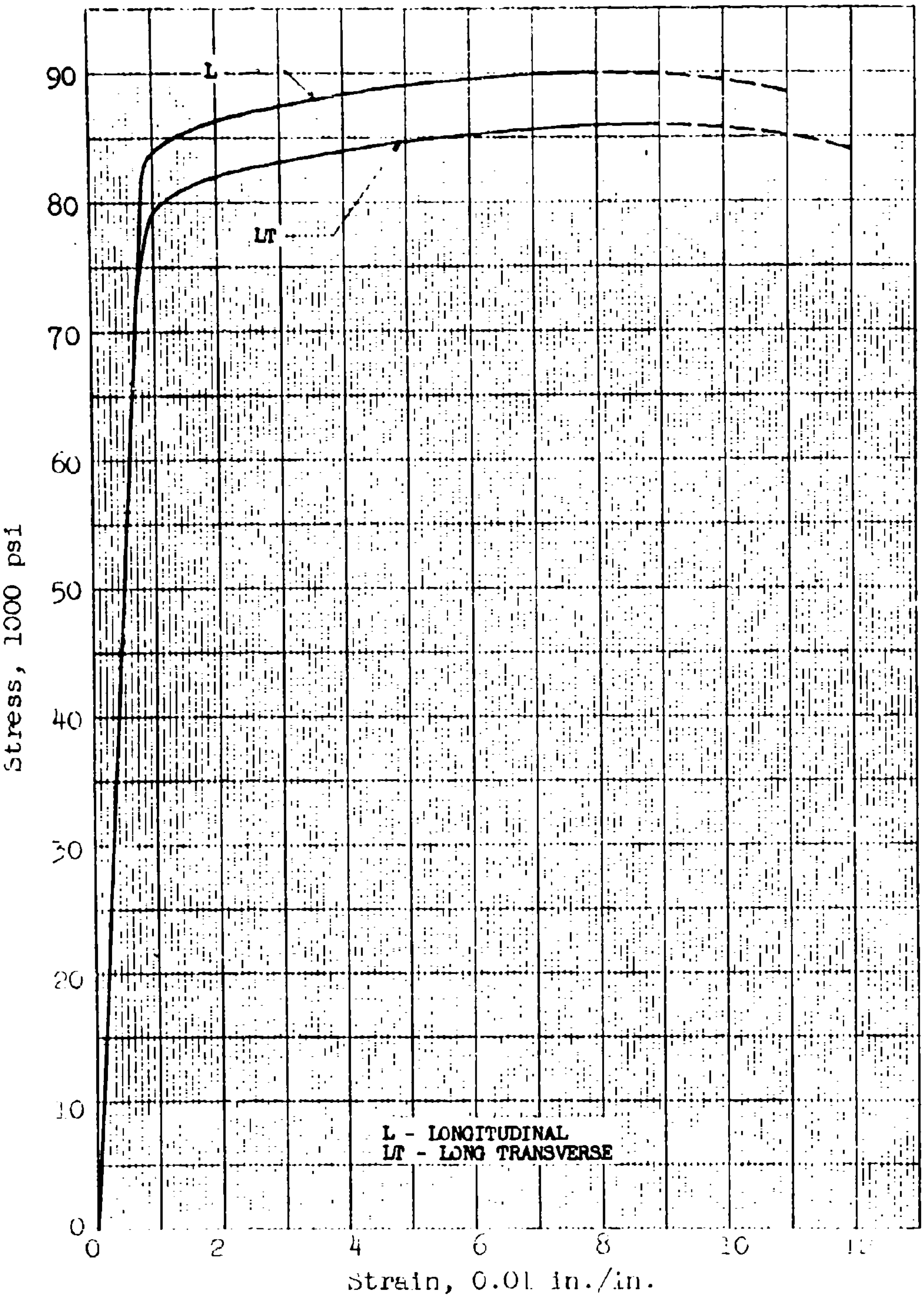


Fig. 46 Typical Tensile Stress-Strain Curves (full range) for 7075-T651X Aluminum Alloy Extrusions, 0.500-0.749 in.

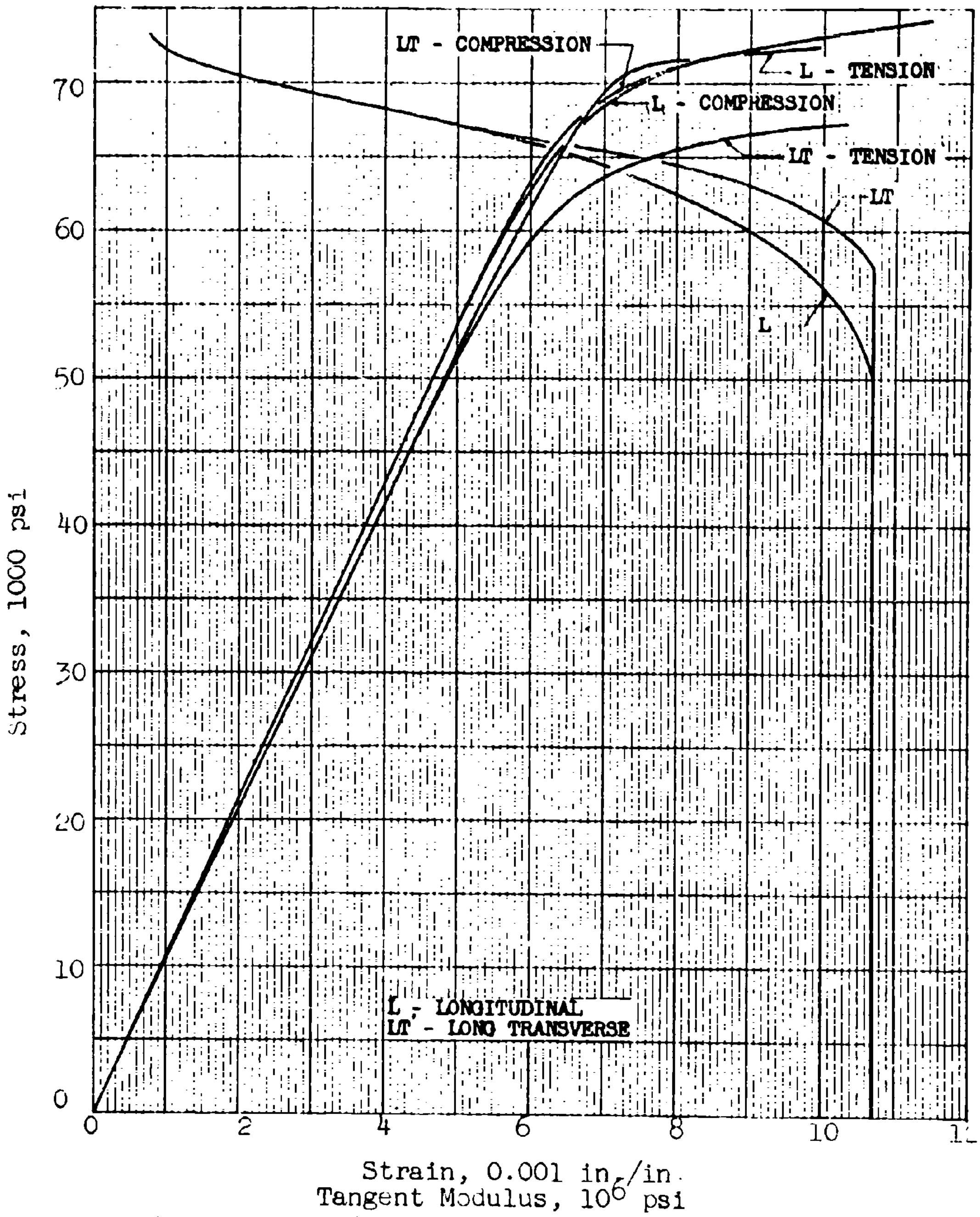


Fig. 47 Minimum ("A" Value) Stress-Strain and Tangent-Modulus Curves for 7075-T651X Aluminum Alloy Extrusions, 0.500-0.749 in.

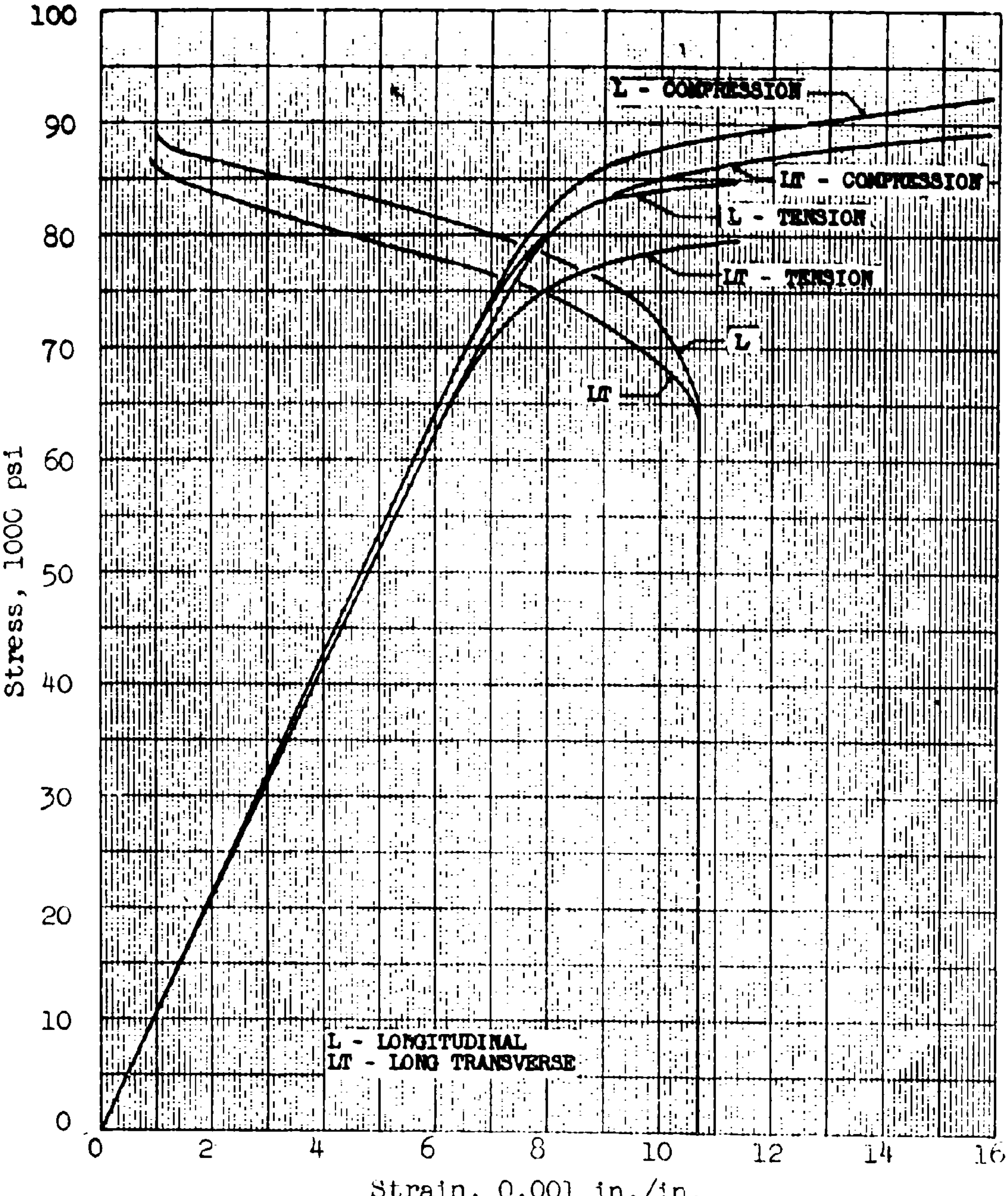


Fig. 48 Typical Stress-Strain and Tangent-Modulus Curves for 7075-T62 Aluminum Alloy Extrusions, 0.250-1.499 in. (Heat-Treated-By-User)

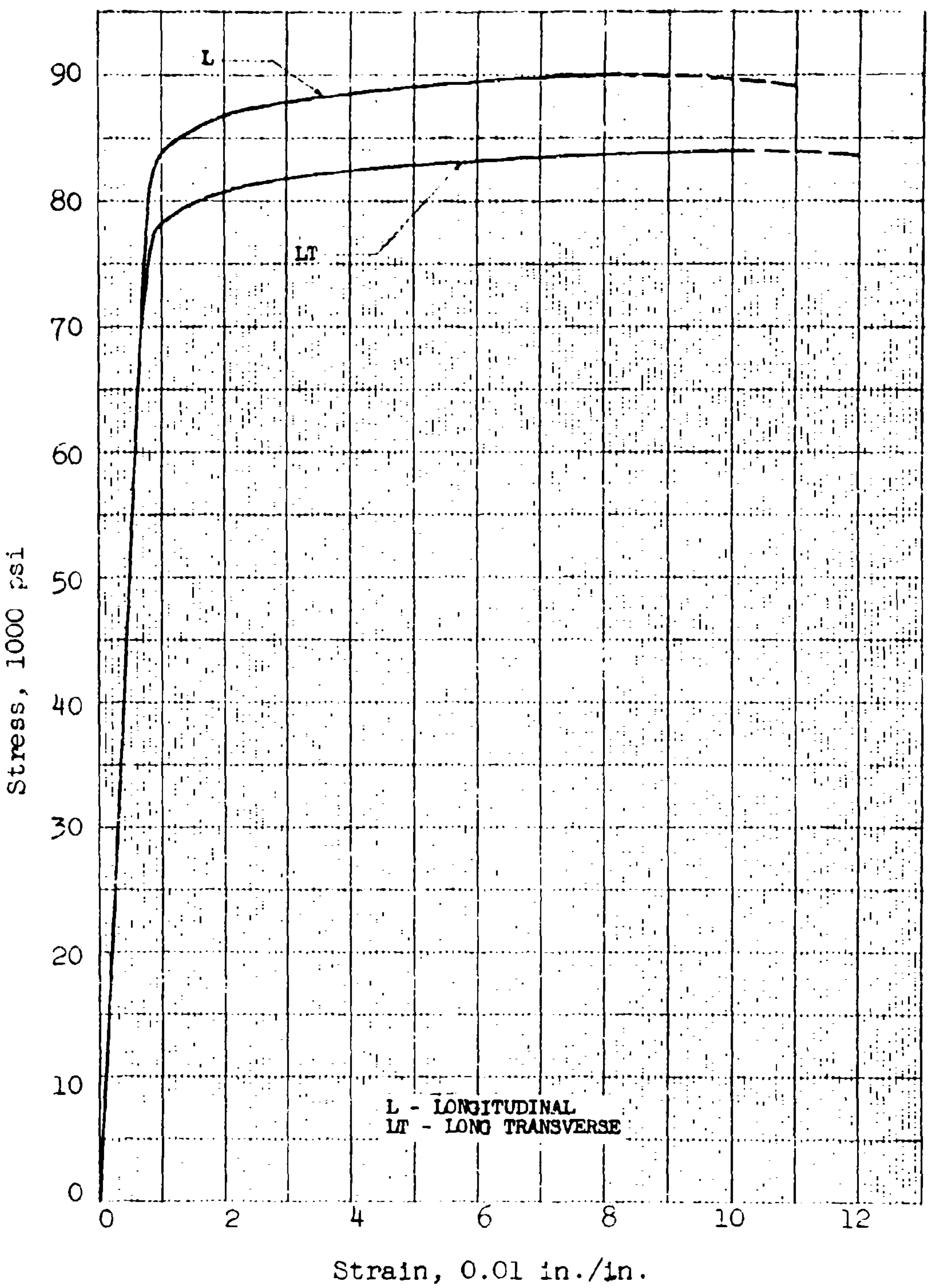


Fig. 49 Typical Tensile Stress-Strain Curves (full range) for 7075-T62 Aluminum Alloy Extrusions, 0.250-1.499 in. (Heat-Treated-By-User)

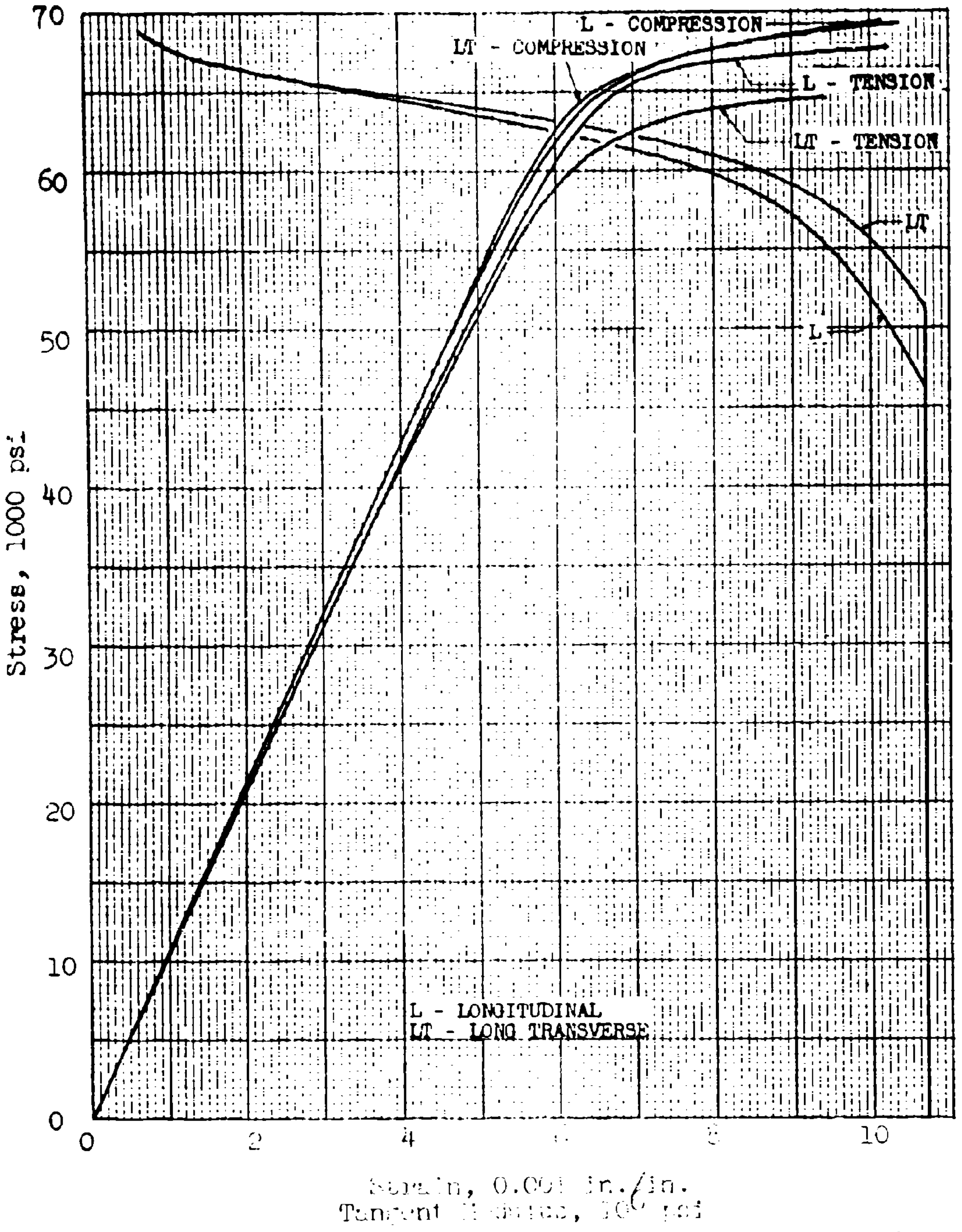


Fig. [illegible] Typical Stress-Strain and Tangent-Modulus Curves for 7075-T[illegible] Aluminum Alloy Extrusions, 0.500-0.749 in.

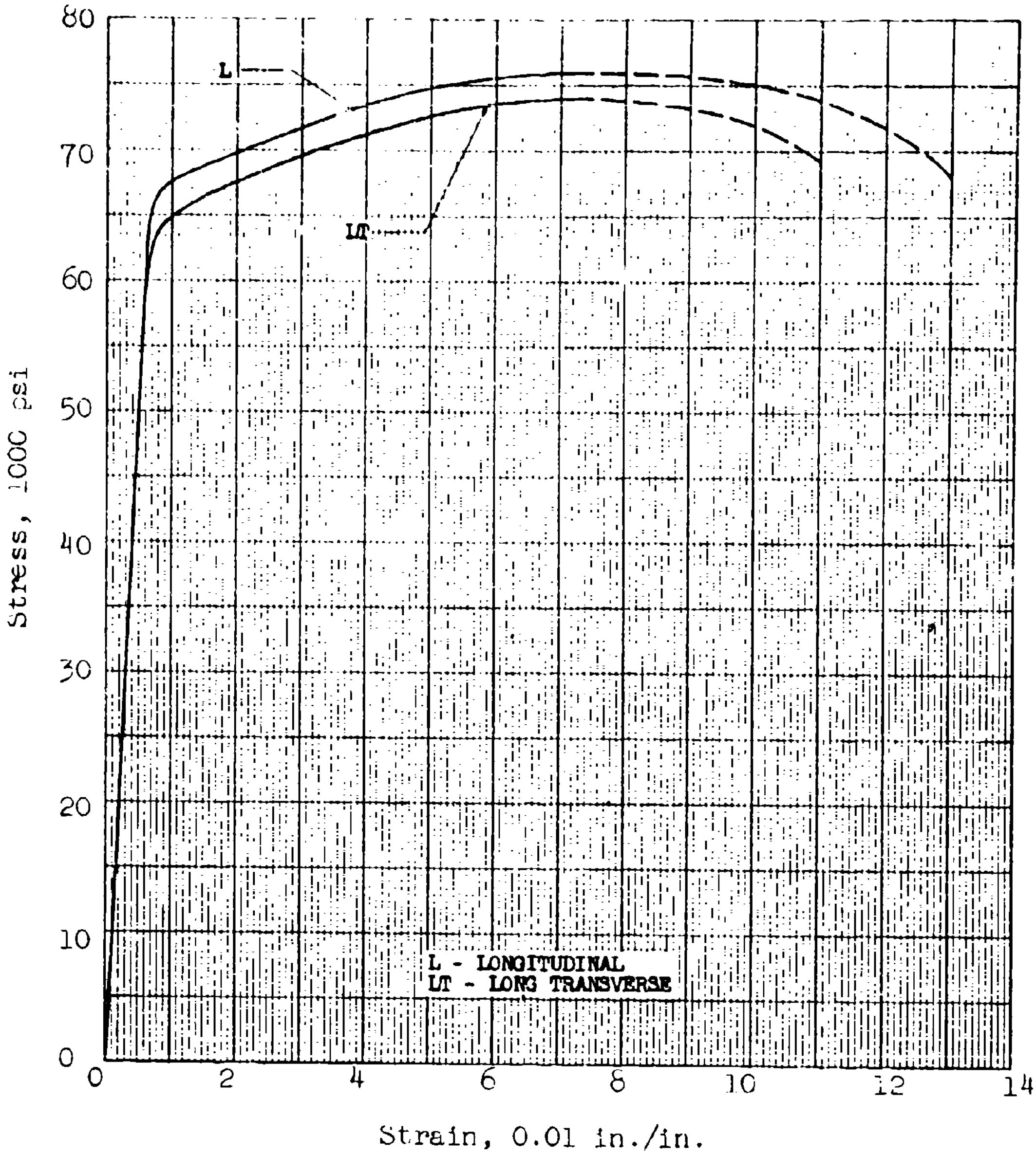


Fig. 51 Typical Tensile Stress-Strain Curves (full range) for 7075-T7351X Aluminum Alloy Extrusions, 0.500-0.749 in.

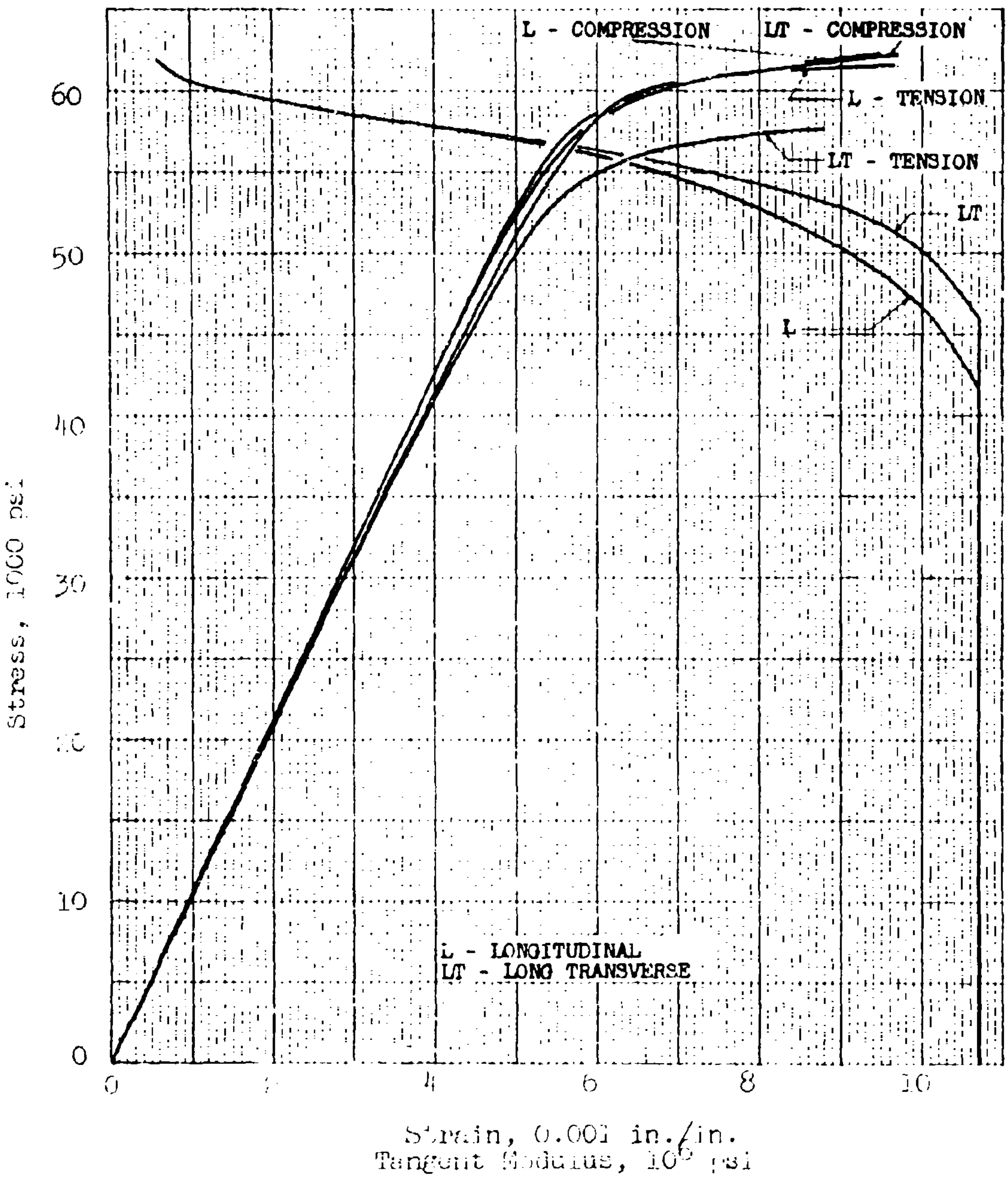


Fig. 52 Minimum ("S" Value) Stress-Strain and Tangent-Modulus Curves for 7075-T7351X Aluminum Alloy Extrusions, 0.500-0.749 in.

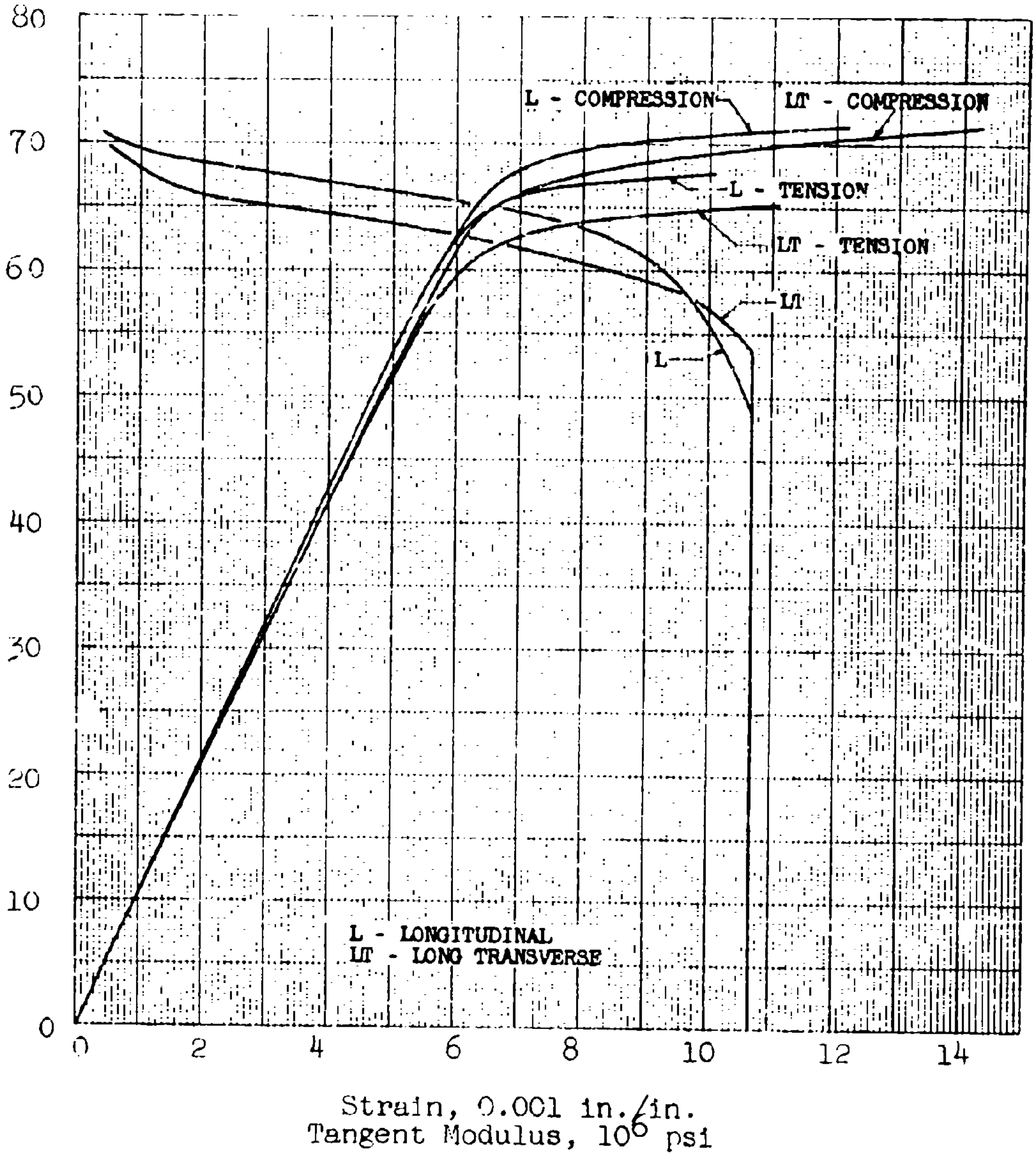


Fig. 53 Typical Stress-Strain and Tangent-Modulus Curves for 7075-T73 Aluminum Alloy Extrusions, 0.250-1.499 in. (Heat-Treated-By-User)

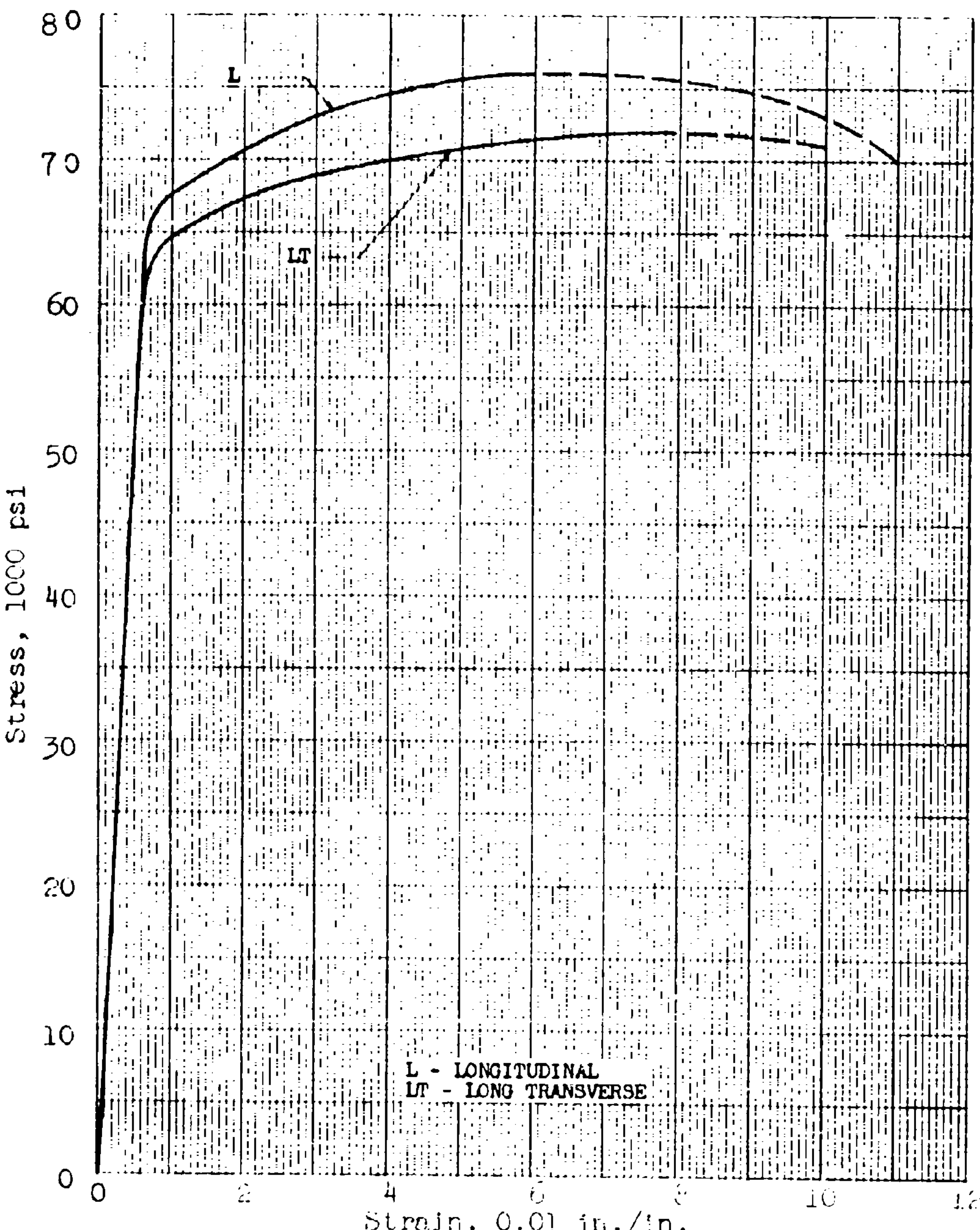


Fig. 54 Typical Tensile Stress-Strain Curves(full range) for
7075-T73 Aluminum Alloy Extrusions, 0.250-1.499 in.
(Heat-Treated-By-User)

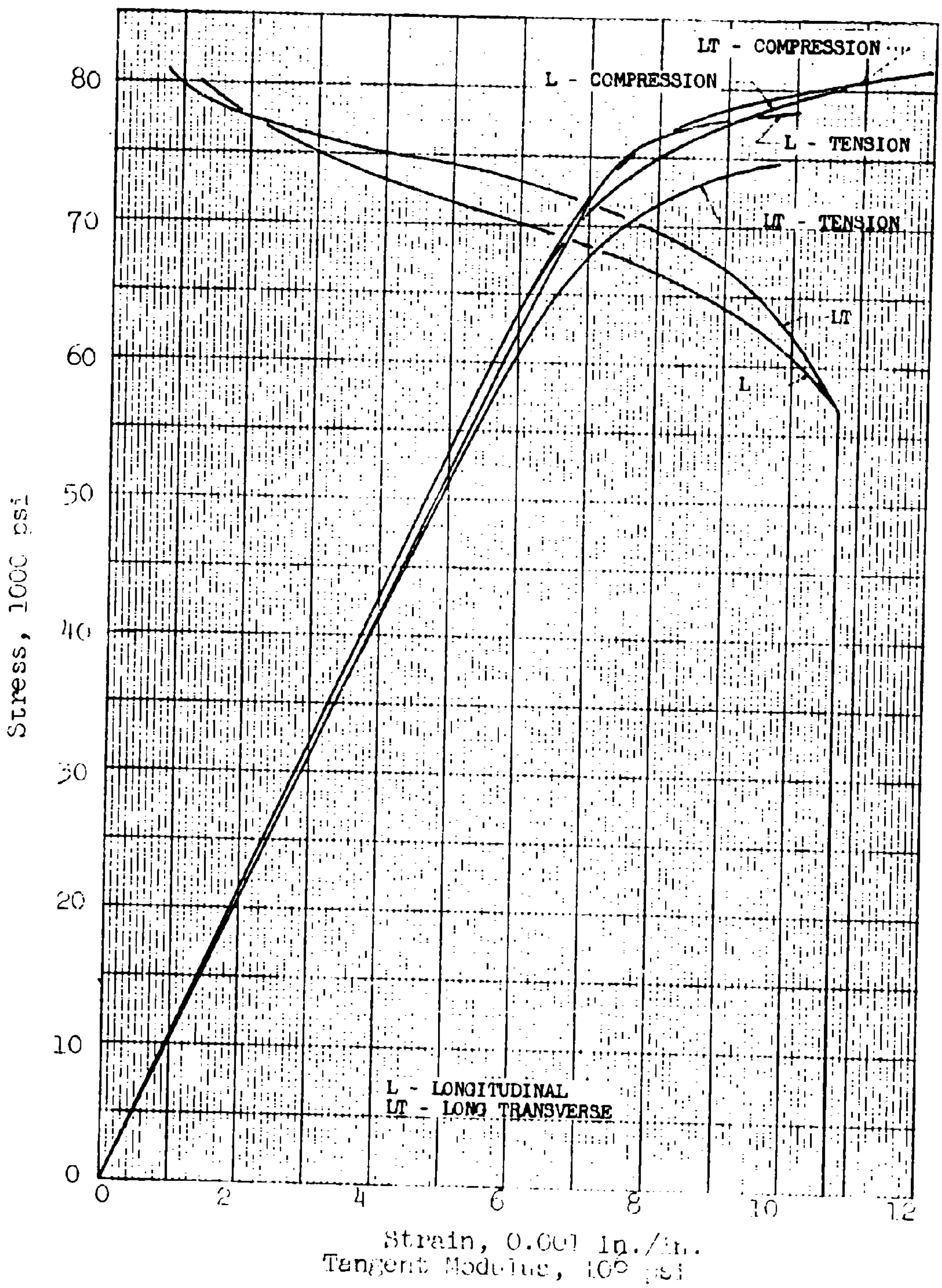


Fig. 55 Typical Stress-Strain and Tangent-Modulus Curves for 7079-T651X Aluminum Alloy Extrusions, 0.249 in.

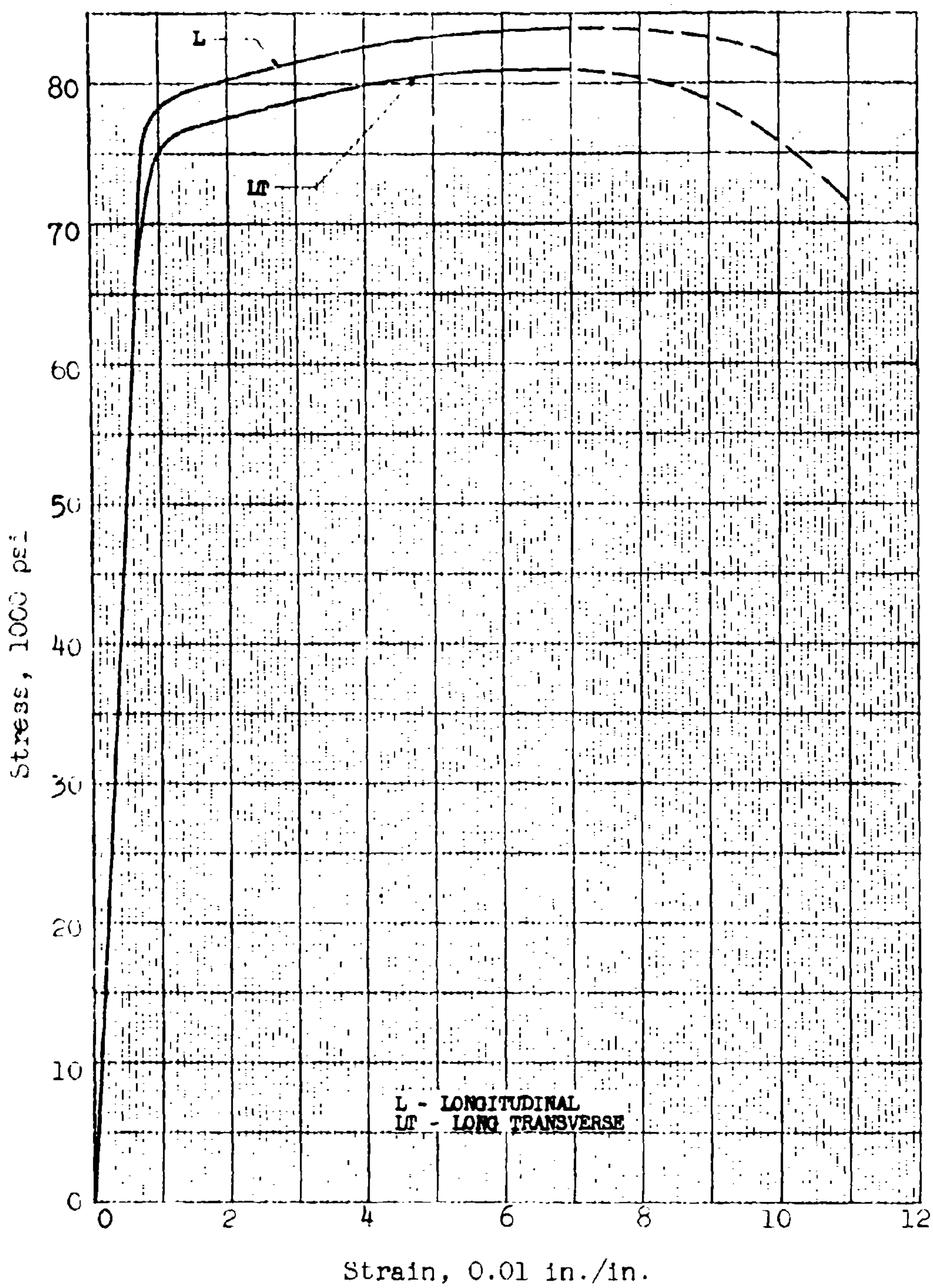


Fig. 56 Typical Tensile Stress-Strain Curves (full range) for 7079-T651X Aluminum Alloy Extrusions, ≥ 0.249 in.

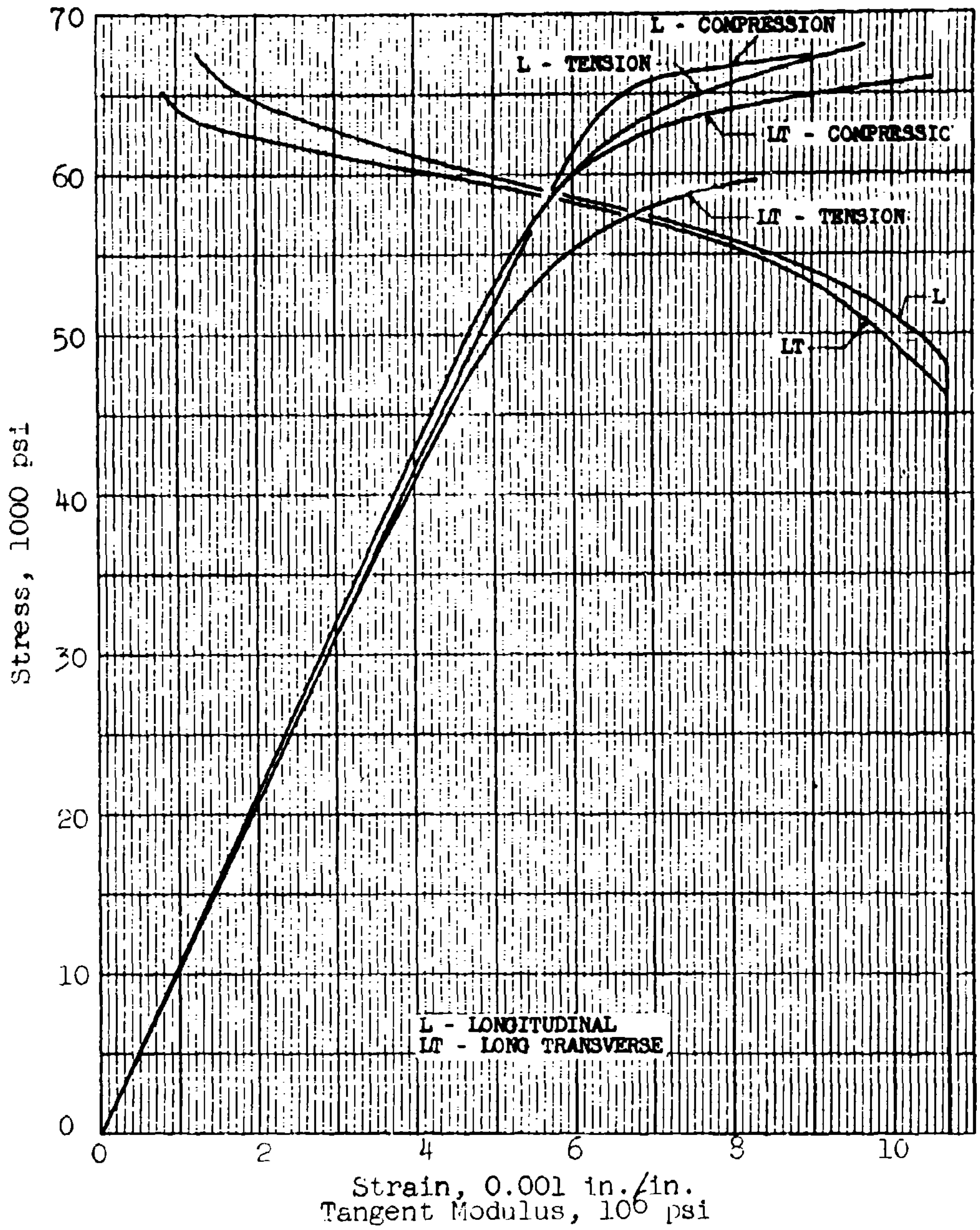


Fig. 57 Minimum ("S" Value) Stress-Strain and Tangent-Modulus Curves for 7079-T651X Aluminum Alloy Extrusions, ≤ 0.249 in.

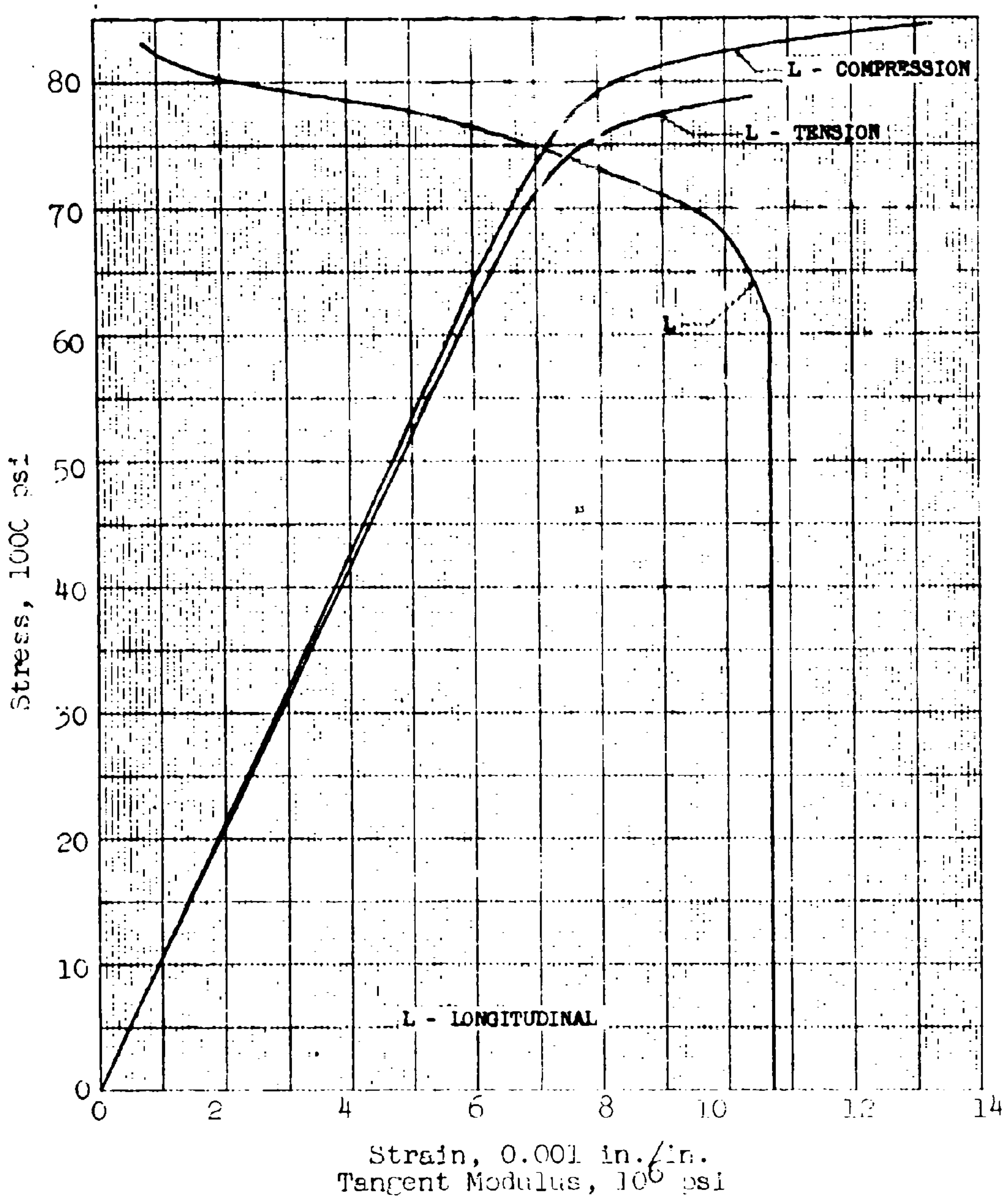


Fig. 50 Typical Stress-Strain and Tangent-Modulus Curves for 7079-T62 Aluminum Alloy Extrusions, [illegible] 0.249 (Heat-Treated-By-User)

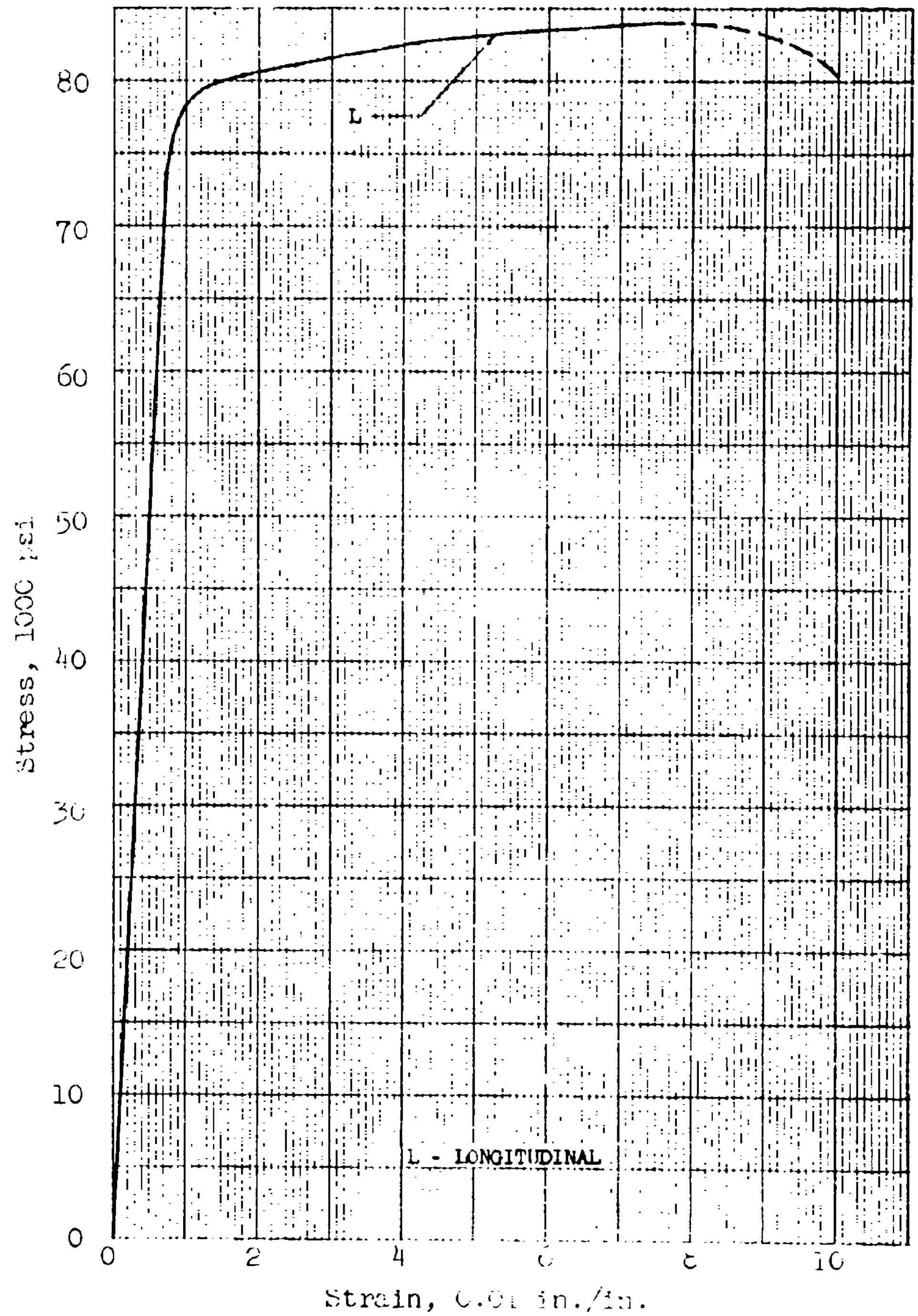


Fig. 59 Typical Tensile Stress-Strain Curve (full range) for 7079-T62 Aluminum Alloy Extrusions, ≥0.249 in. (Heat-Treated-By-User)

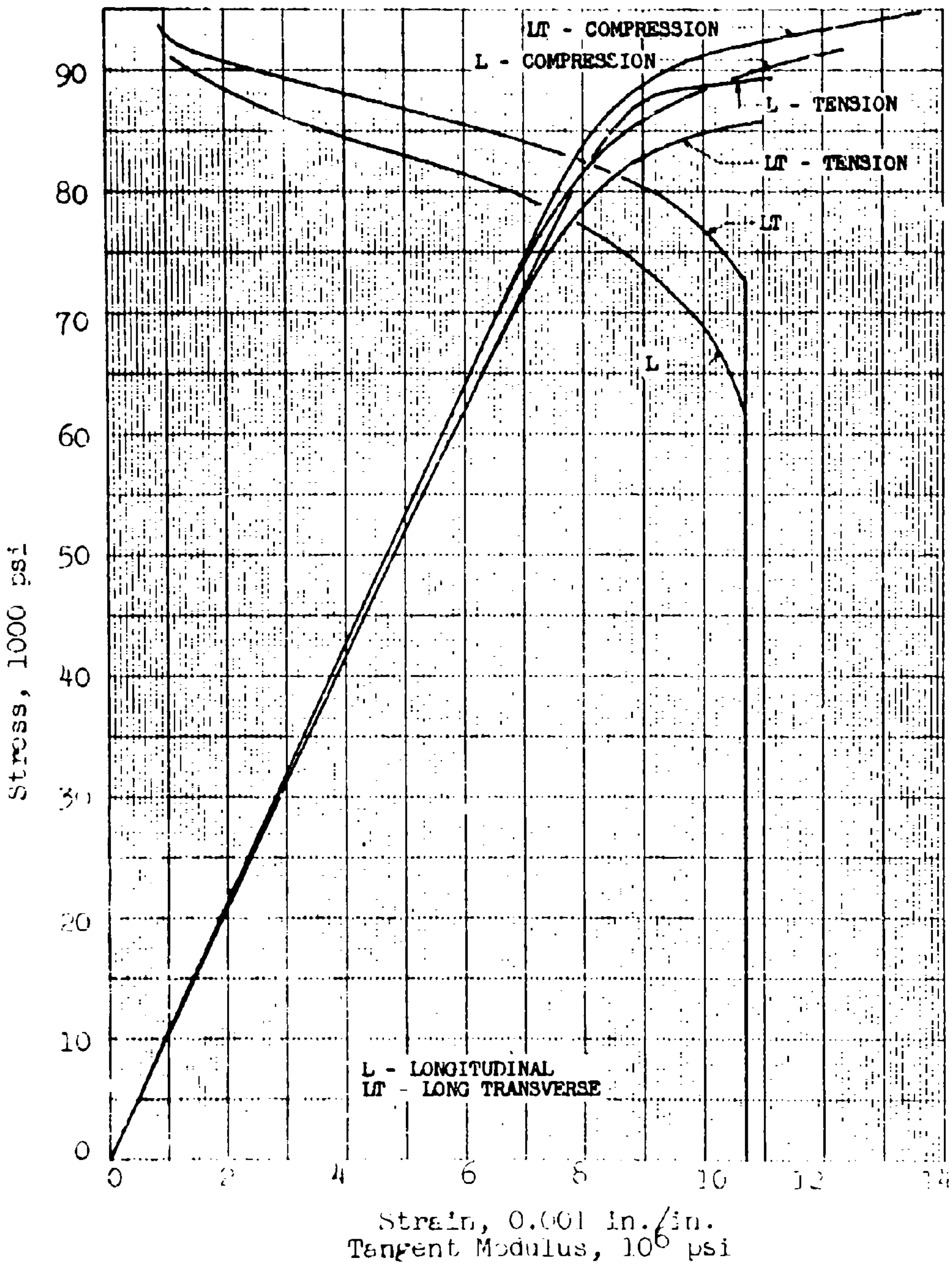


Fig. 60 Typical Stress-Strain and Tangent-Modulus Curves
7178-T651X Aluminum Alloy Extrusions, 0.062-0.249 in.

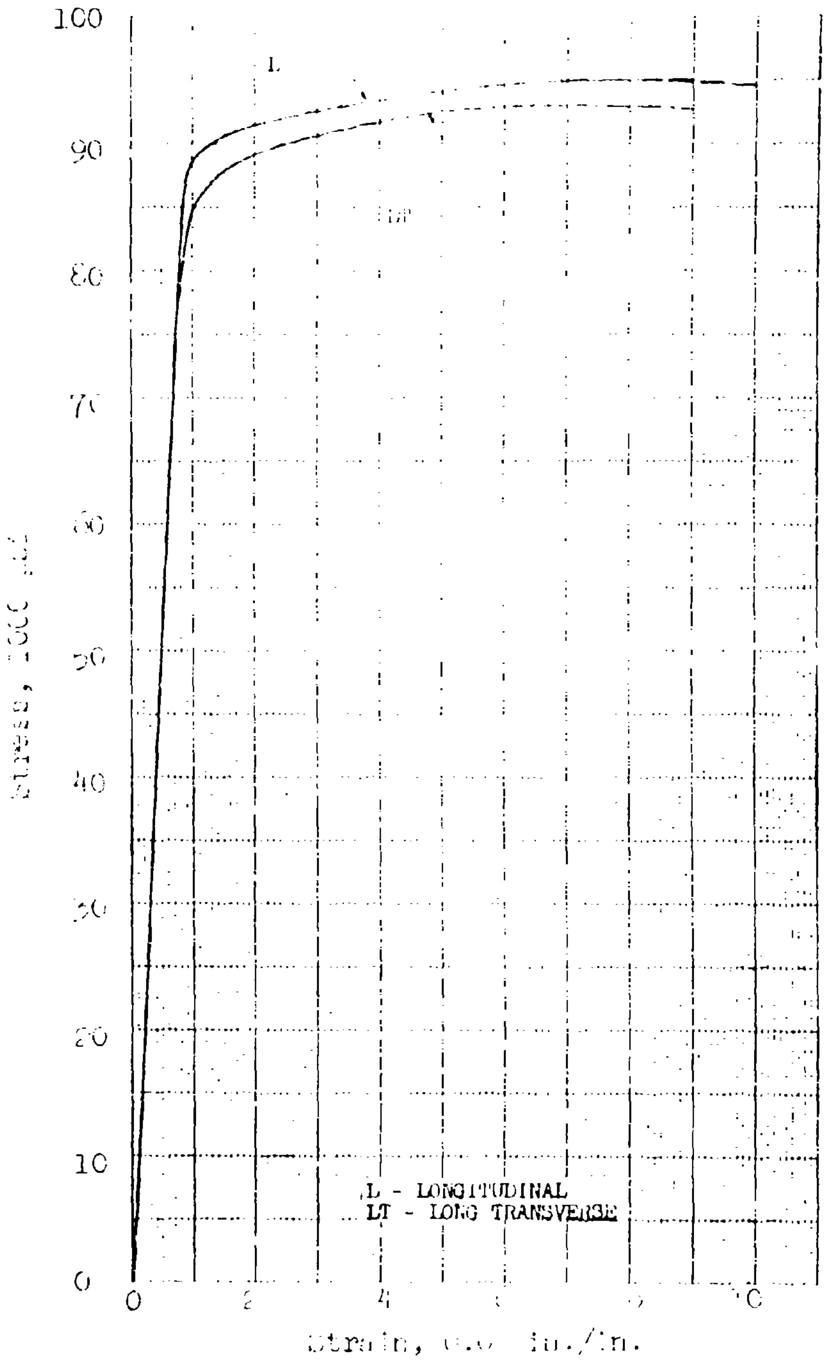


Fig. 61 Typical Tensile Stress-Strain Curves (full range) for [illegible] Aluminum Alloy Extrusions, [illegible] In.

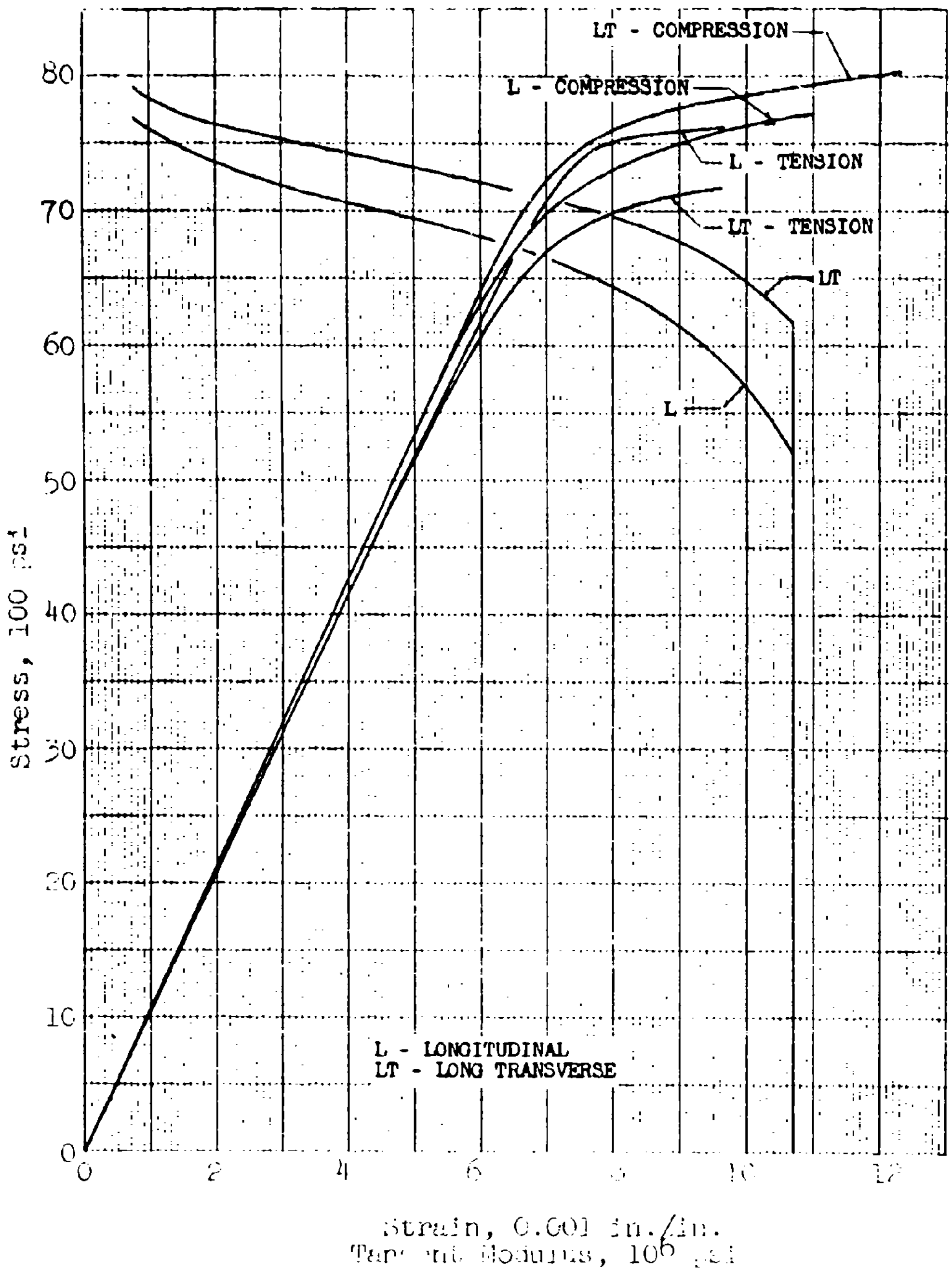


Fig. [illegible] ([illegible] Value) Stress-Strain and Tangent-Modulus Curves for [illegible] Aluminum Alloy Extrusions, 0.062-0.[illegible] in.

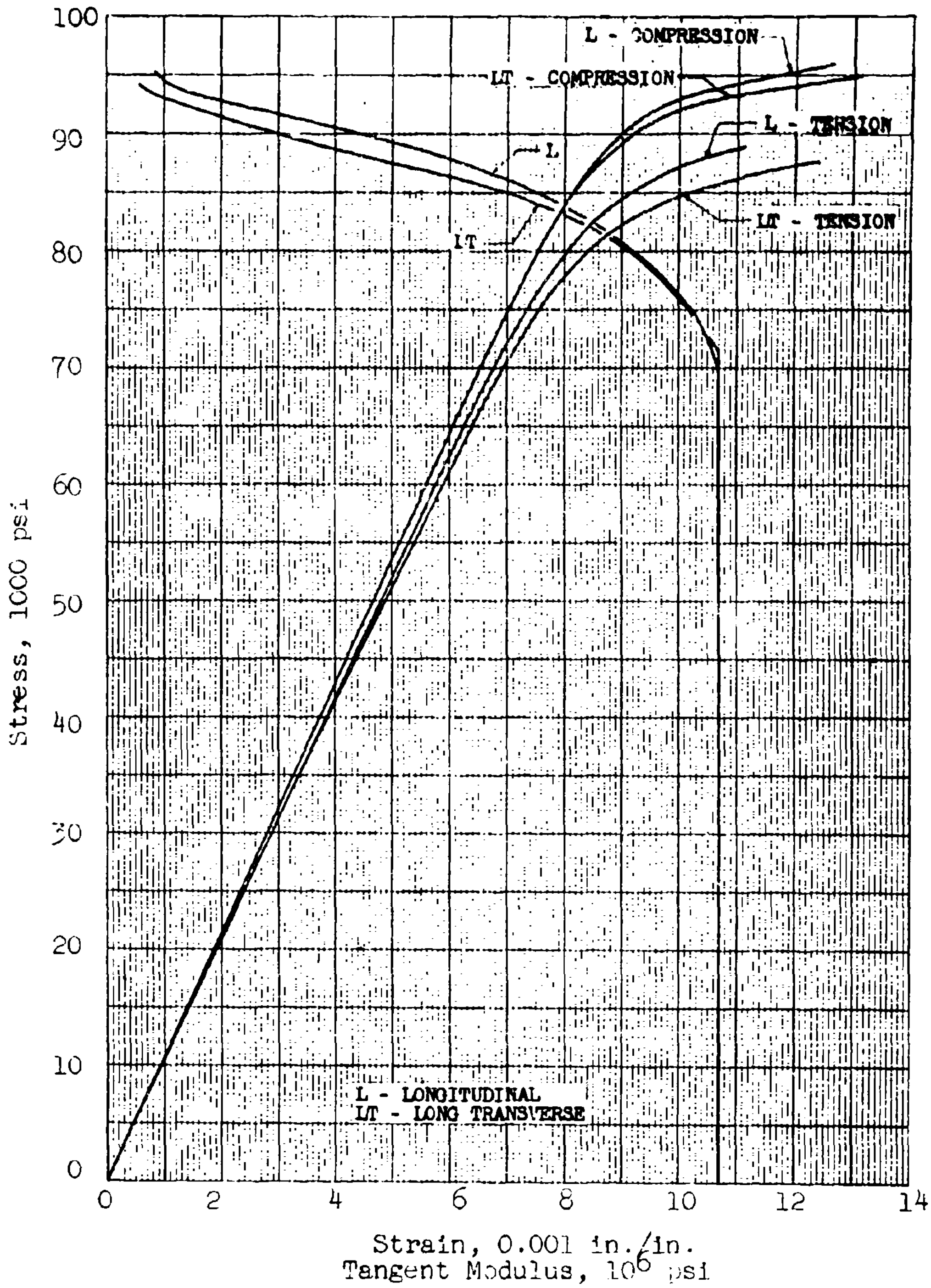
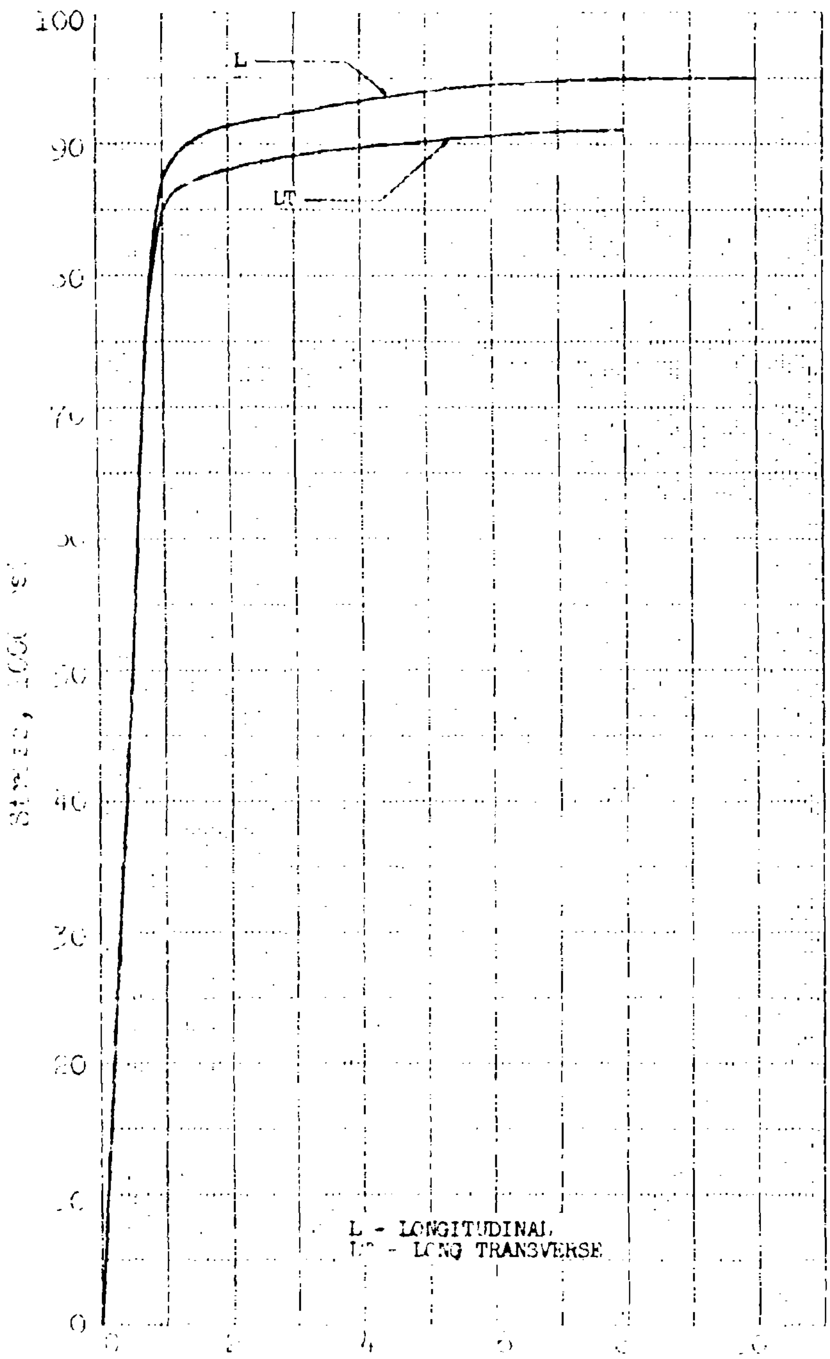


Fig. 63 Typical Stress-Strain and Tangent-Modulus Curves for 7178-T62 Aluminum Alloy Extrusions, 0.062-0.249 in. (Heat-Treated-By-User)



Strain, 0.01 [illegible]
Fig. [illegible] Typical Tensile [illegible] (full range) for 7178-T6 [illegible] Extrusions, 0.062-0.249 in. ([illegible])

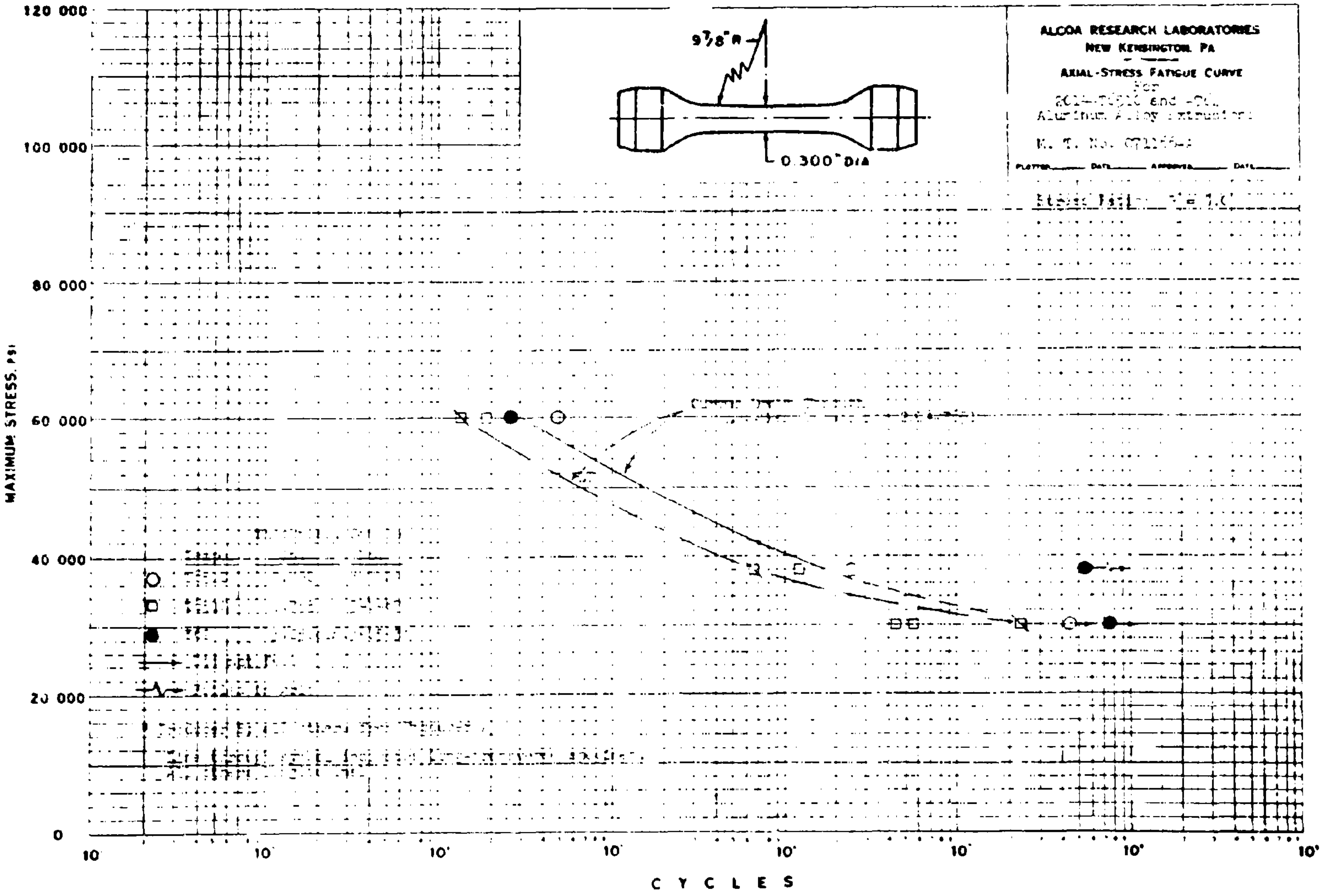

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON PA
AXIAL-STRESS FATIGUE CURVE
PLOTTED — DATE — APPROVED — DATE
9 7/8" R
0.300" DIA
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES

Fig. 65

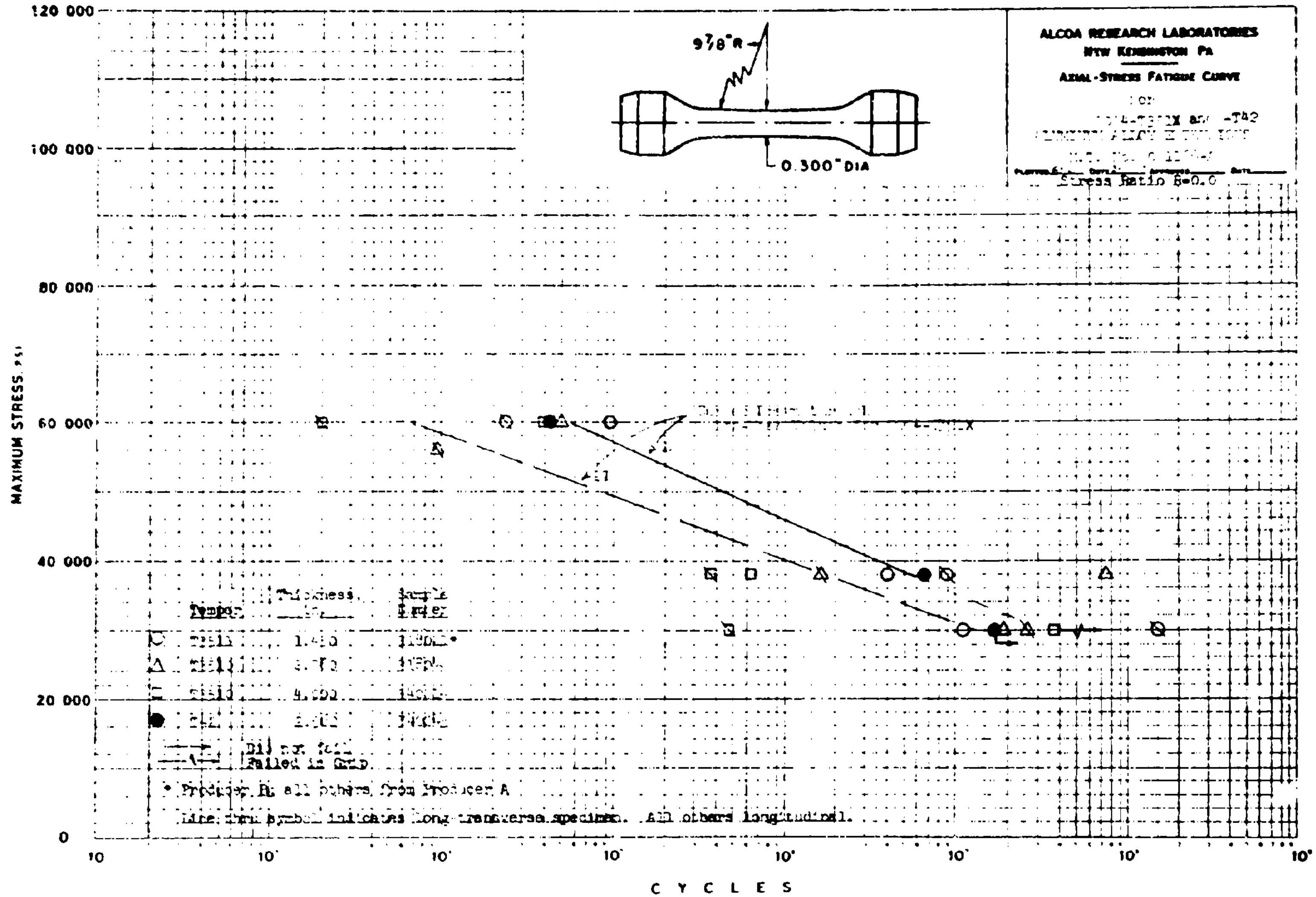

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON PA
AXIAL-STRESS FATIGUE CURVE
Stress Ratio R=0.0
9⅞" R
0.300" DIA
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
10
C Y C L E S
Temper
Thickness,
Sample
Did not fail
Failed in Grip
Line thru symbol indicates long-transverse specimen. All others longitudinal.

Fig. 66

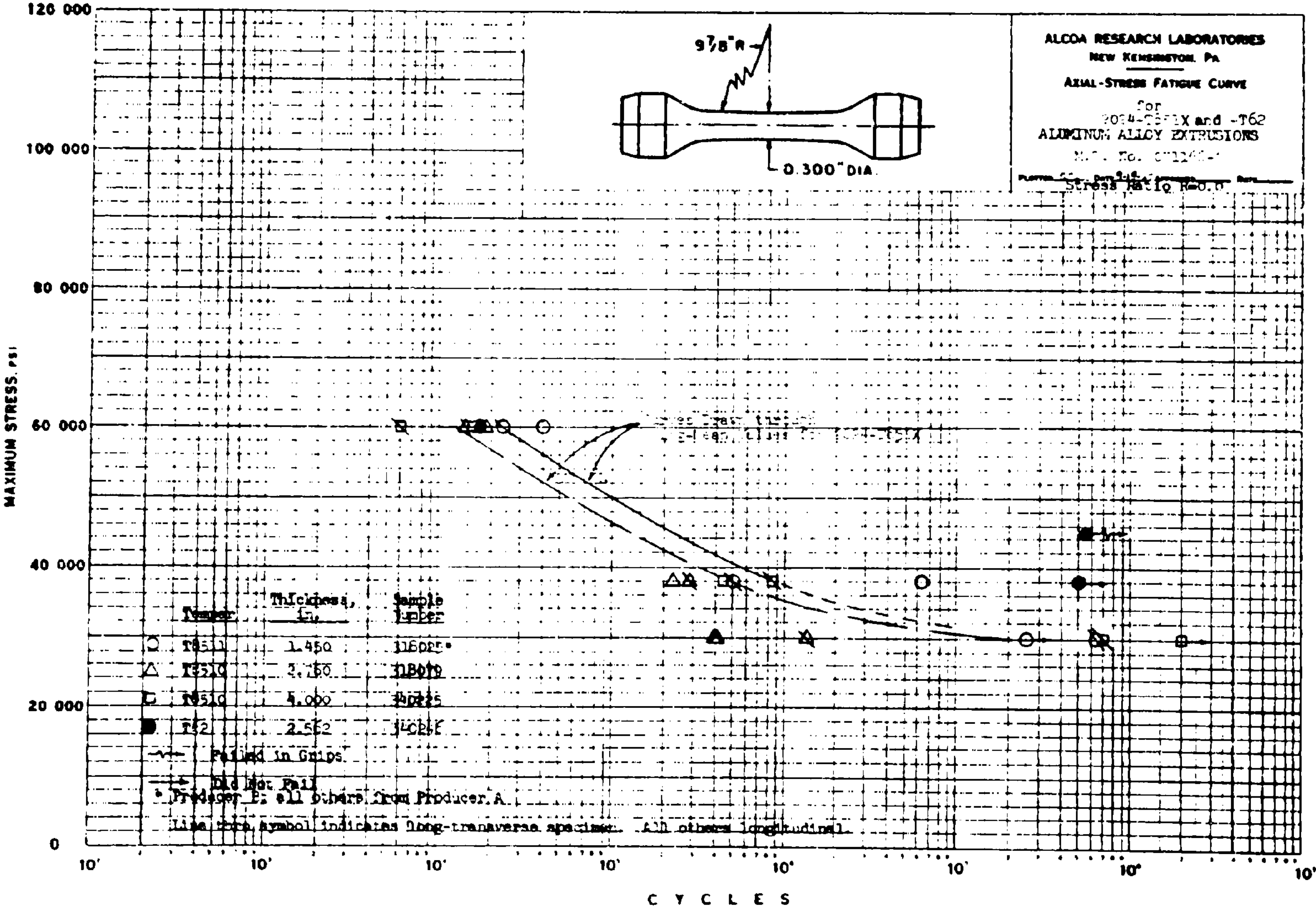

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA
AXIAL-STRESS FATIGUE CURVE
for
ALUMINUM ALLOY EXTRUSIONS
Stress Ratio R=0.0
0.300" DIA
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
Temper
Thickness, In.
Sample Number
T6511
1.450
T6510
T62
2.562
4.000
Failed in Grips
Did Not Fail
* Producer B; all others from Producer A
CYCLES

Fig. 67

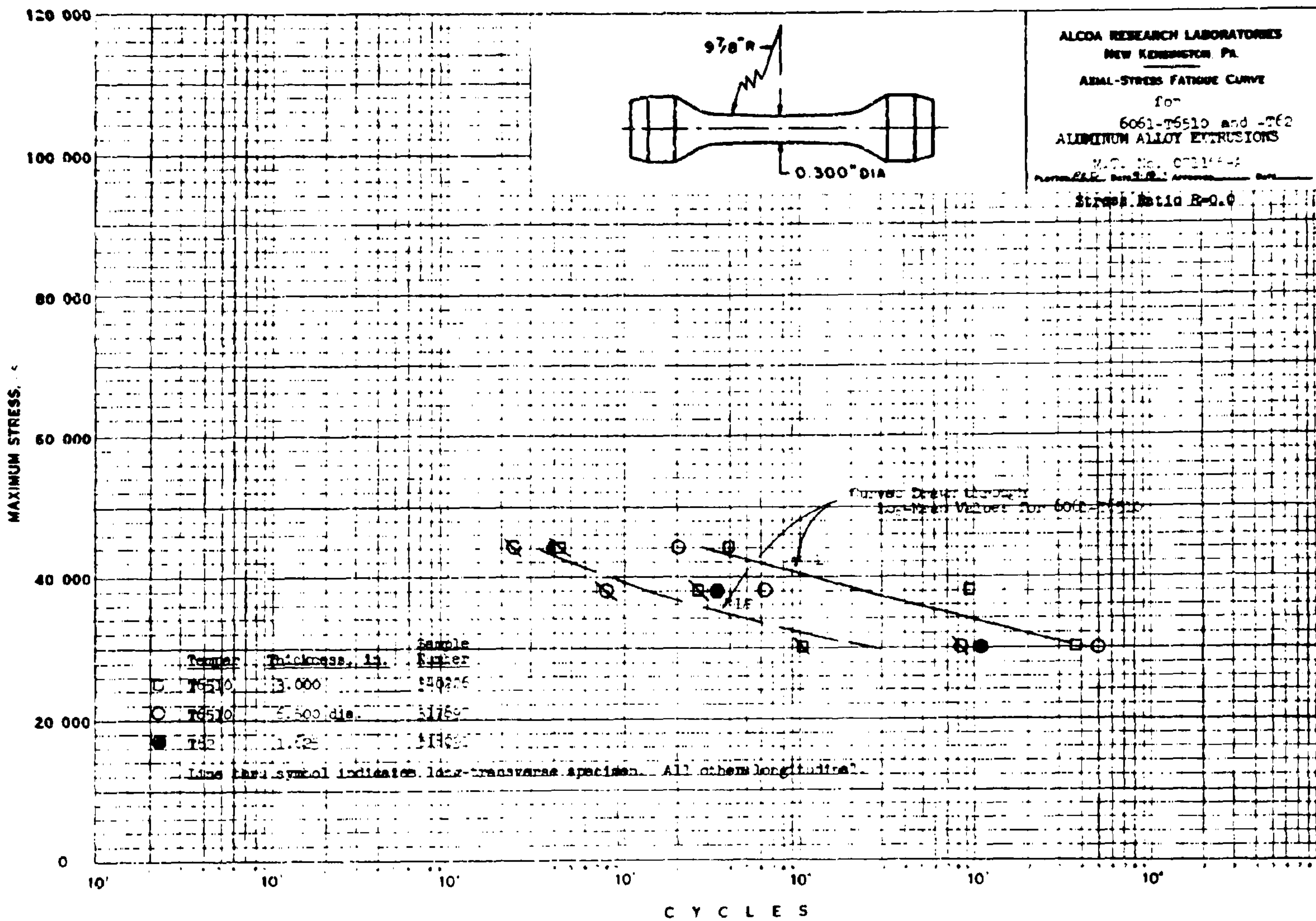

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON PA
AXIAL-STRESS FATIGUE CURVE
for
6061-T6510 and -T62
ALUMINUM ALLOY EXTRUSIONS
Stress Ratio R=0.0
9 7/8" R
0.300" DIA
MAXIMUM STRESS,
CYCLES
Temper
Thickness, in.
Sample
Number
T6510
3.000
T6510
dia.
T62
Line thru symbol indicates long-transverse specimen. All others longitudinal.
120 000
100 000
80 000
60 000
40 000
20 000
0

Fig. 68

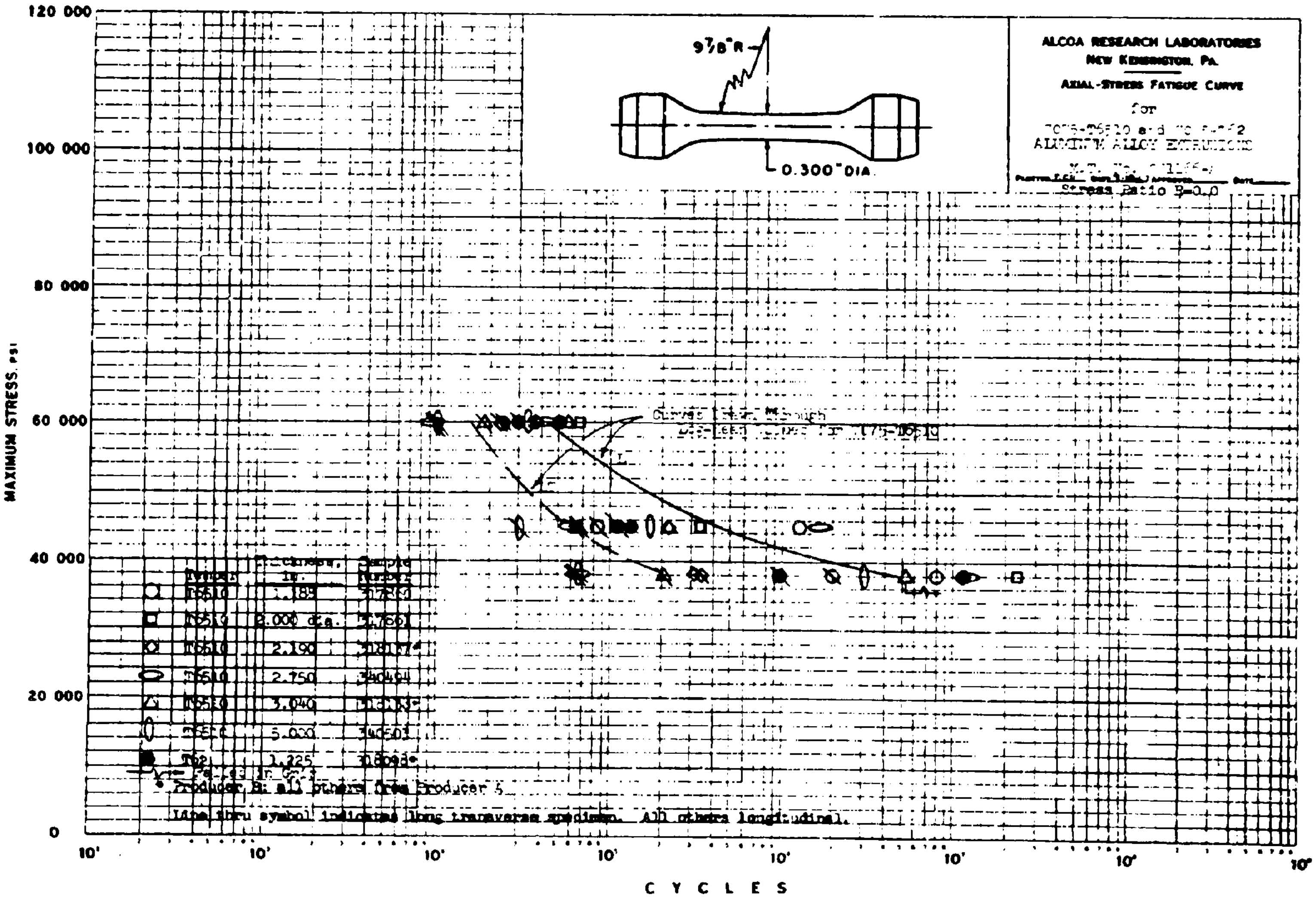
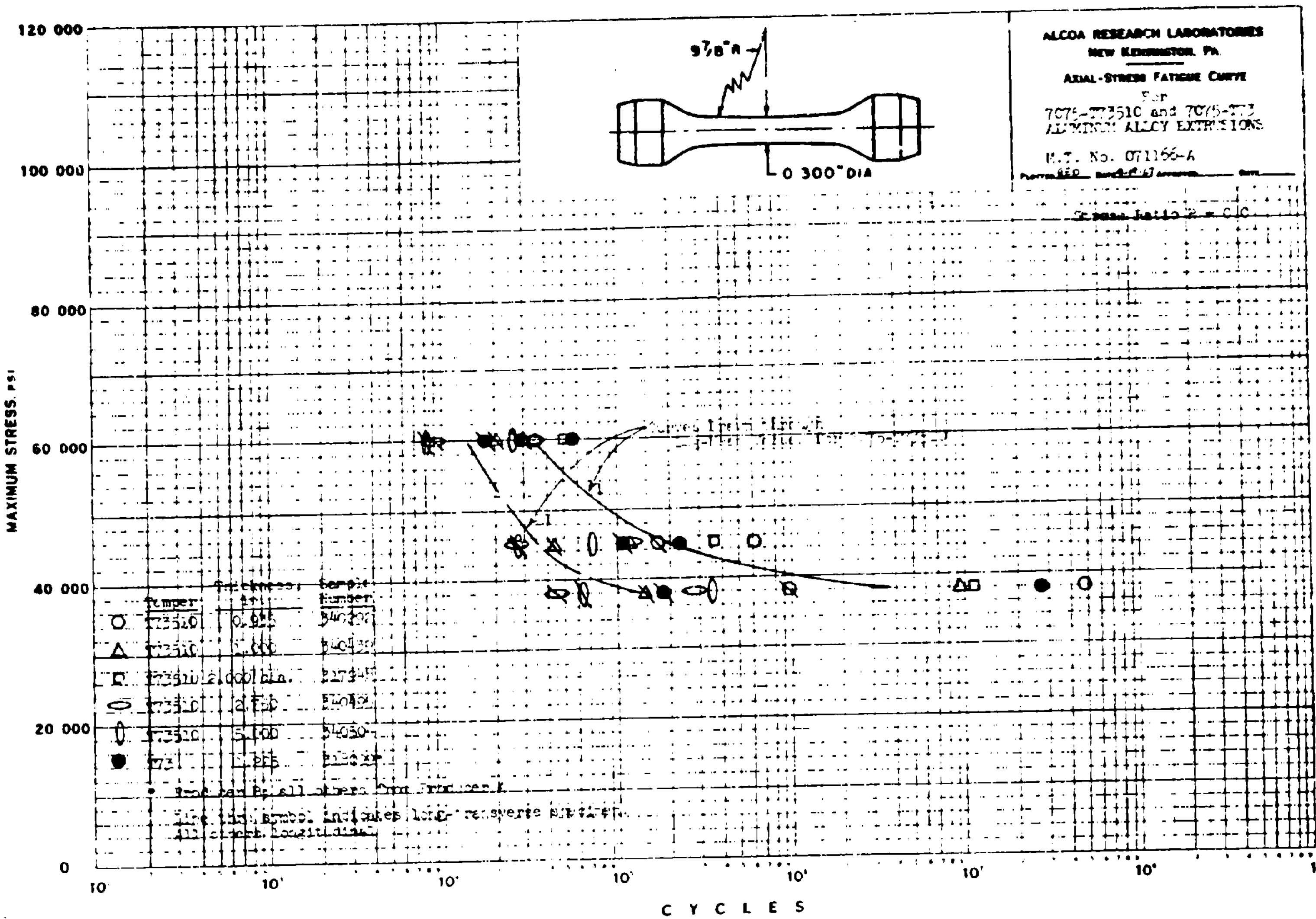
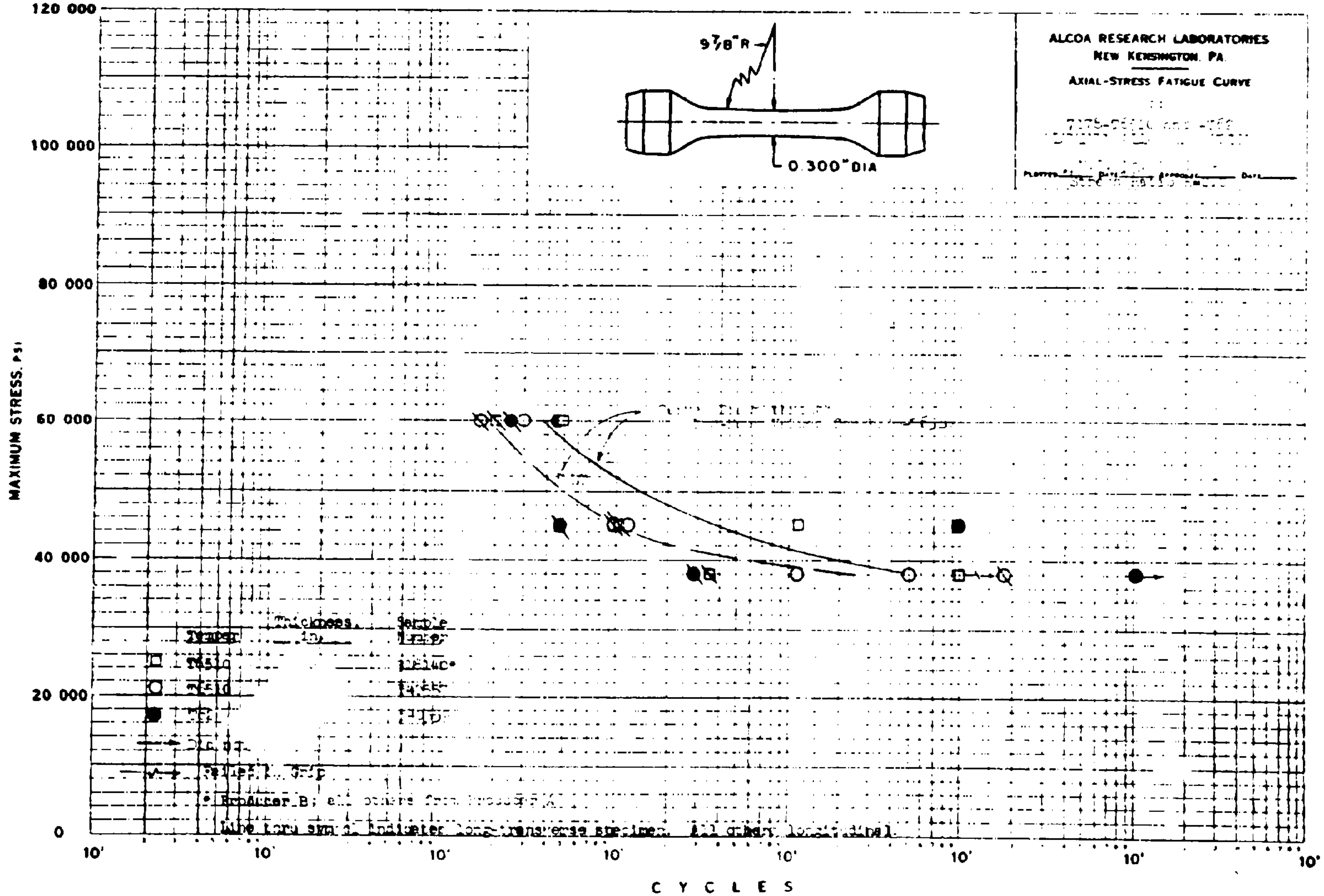

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
Stress Ratio R=0.0
9 7/8" R
0.300" DIA
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES
T6510
1.189
2.000 dia.
2.190
2.750
3.040
5.000
1.225
Line thru symbol indicates long transverse specimen. All others longitudinal.

Fig. 69



ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
0 300" DIA
120 000
100 000
80 000
60 000
40 000
20 000
0
MAXIMUM STRESS, psi
CYCLES

Fig. 70



ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA
AXIAL-STRESS FATIGUE CURVE
9 7/8" R
0.300" DIA
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES

Fig. 71

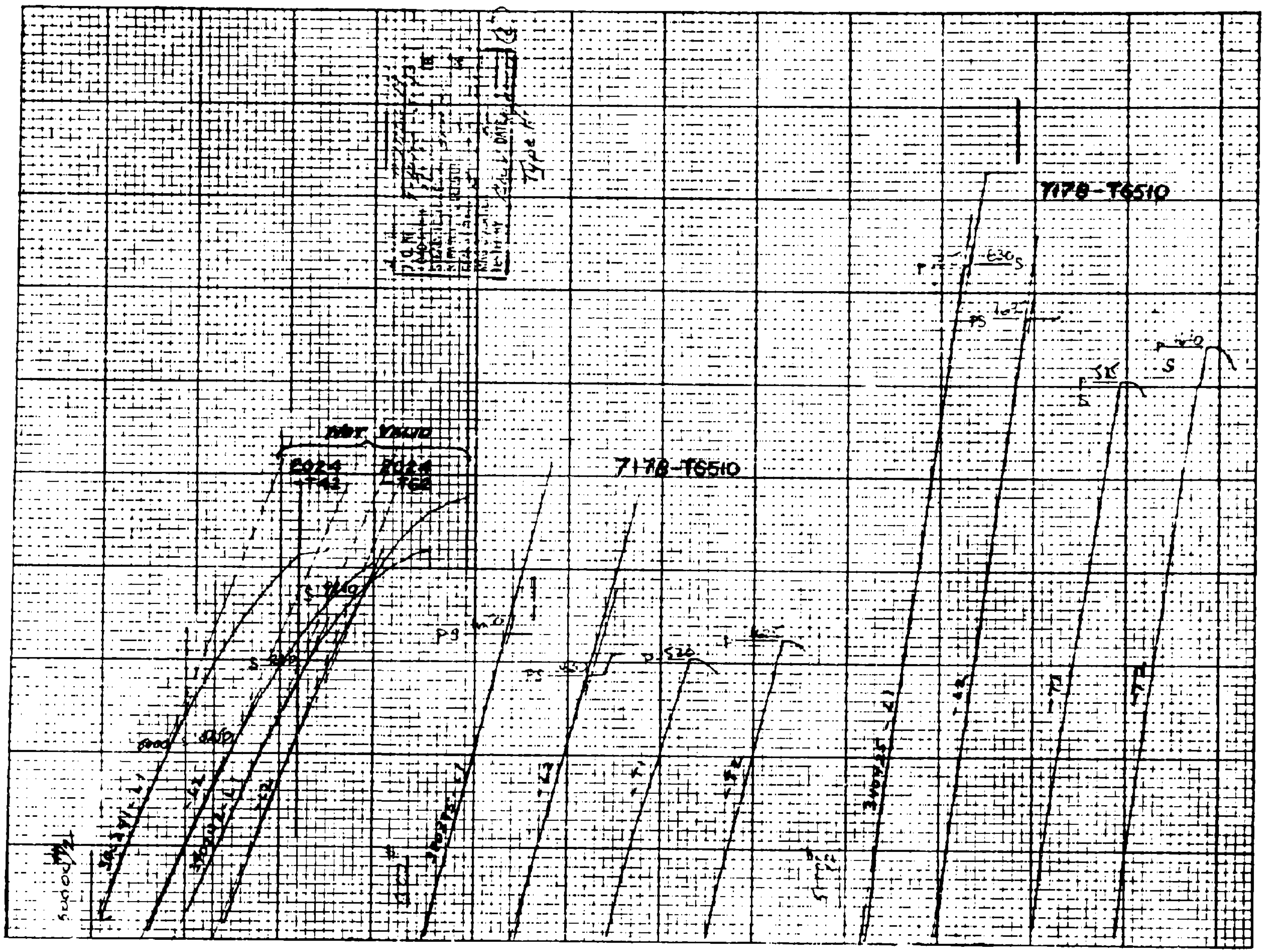
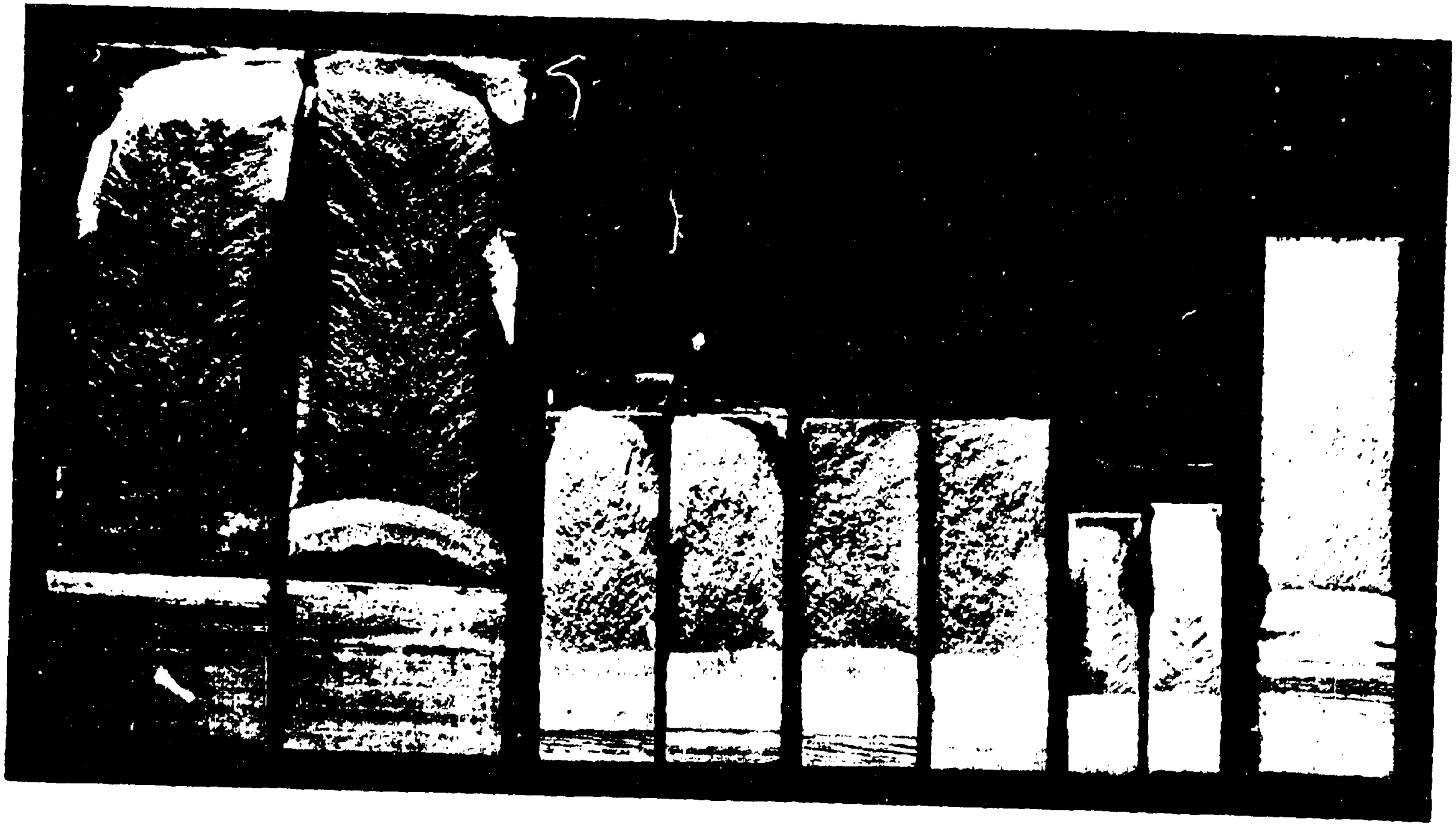


Fig. 72 [illegible] Fracture-Toughness [illegible]



Approx. 0.8X

Fig. 73 Fracture Surfaces of Single-Edge-Notched Tensile Specimens with Satisfactor Fatigue-Crack Fronts

Approx. 0.8X

Fig. 74 Fracture Surfaces of Single-Edge-Notched Tensile Specimens with Excessive Fatigue-Crack Curvature

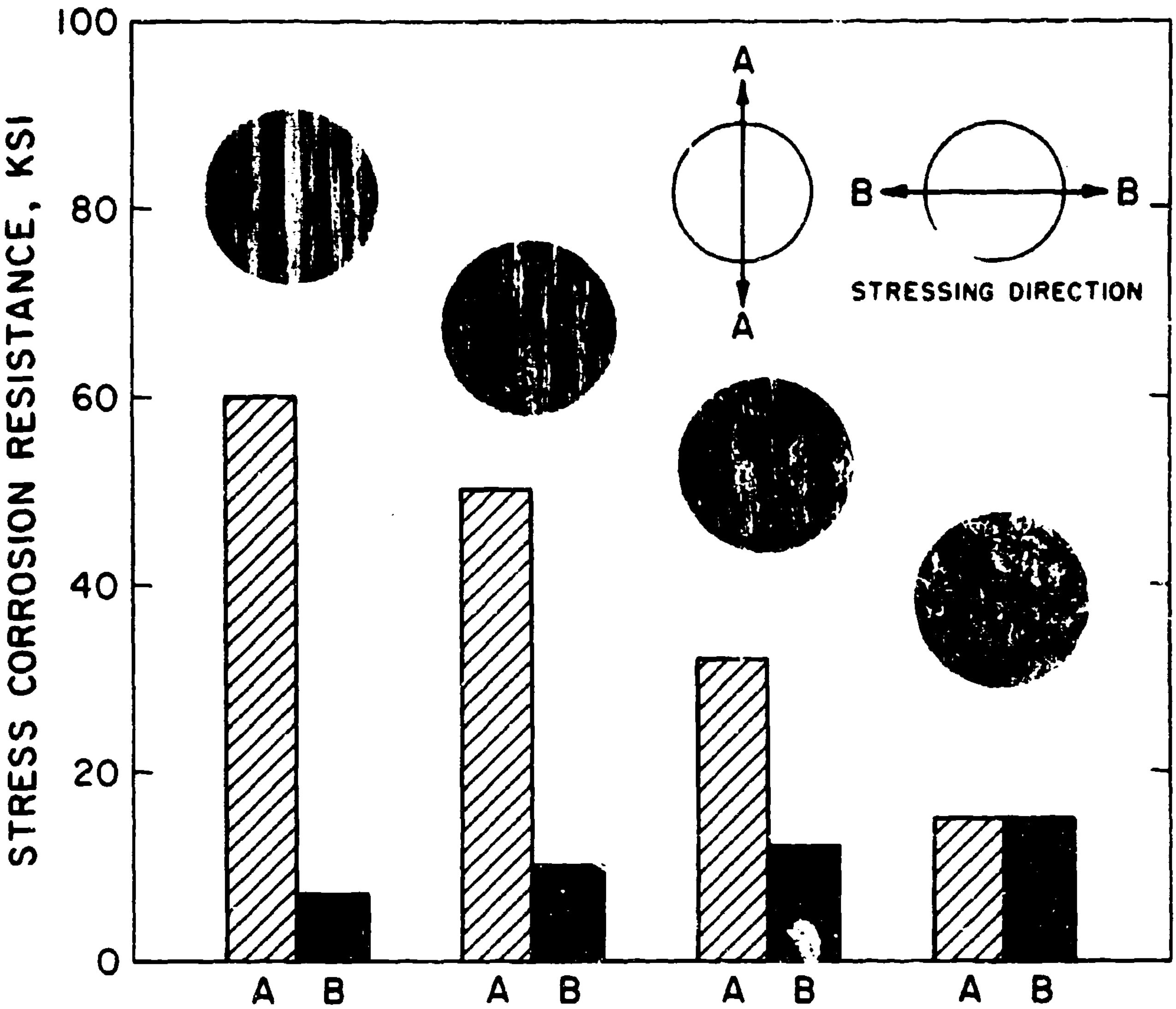


Fig. 75 Effect of Grain Geometry and Stressing Direction on Resistance to Stress-Corrosion Cracking

With extruded shapes of 7075-T6 alloy displaying the various grain structures shown, the stress-corrosion resistance was determined in two directions: parallel (A) and perpendicular (B) to the principal grain axis. Stress-corrosion resistance was defined as the highest initially applied tensile stress that did not cause stress-corrosion cracking in 84 days of exposure to the 3.5% NaCl alternate immersion test. The resistance to stress-corrosion cracking was highest when the most highly oriented grain structure was stressed parallel to the principal grain axis and lowest when the stressing direction was perpendicular to the principal grain axis This same trend is applicable to other susceptible alloy-temper combinations.

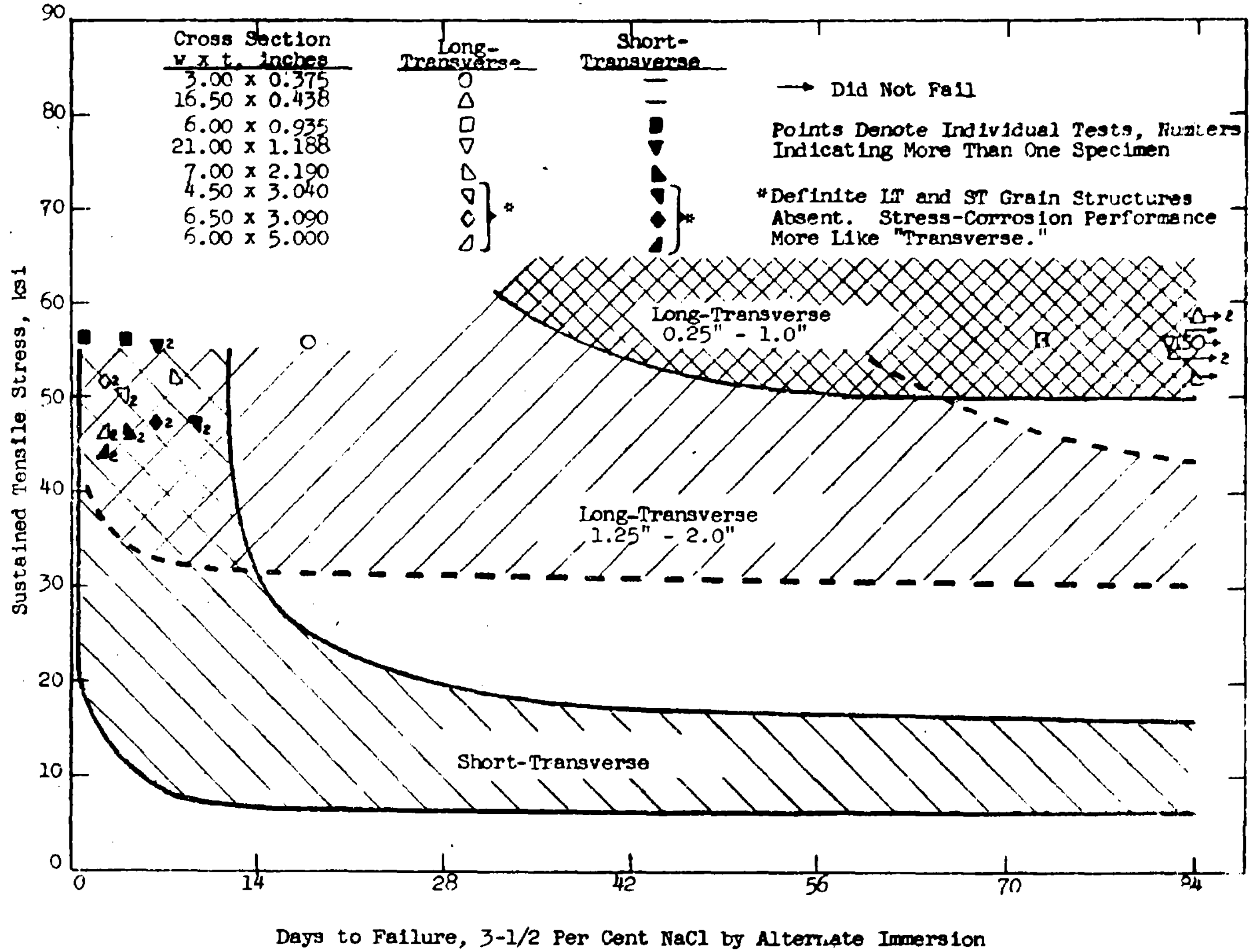


Figure 76. Stress-corrosion data for 7075-T6510 extruded sections showing that the resistance of long-transverse and short-transverse specimens from the contract material was typical and generally within the performance bands developed by a large number of tests of 7075-T6 alloy extruded sections..(18)

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)
Aluminum Company of America

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b. GROUP

3. REPORT TITLE
MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS-CORROSION CRACKING, OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
March 1966 - January 1968 Final

5. AUTHOR(S) (First name, middle initial, last name)
D. J. Brownhill, R. E. Davies and D. O. Sprowls

6. REPORT DATE
February 1968

7a. TOTAL NO. OF PAGES
178

7b. NO. OF REFS
18

8a. CONTRACT OR GRANT NO
AF33(615)-3580

b. PROJECT NO
7381

c. Task No.
738106

d.

9a. ORIGINATOR'S REPORT NUMBER(S)

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
AFML-TR-68-34

10. DISTRIBUTION STATEMENT This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio 45433.

11. SUPPLEMENTARY NOTES
None

12. SPONSORING MILITARY ACTIVITY
Air Force Materials Laboratory (MAAM)
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio

13. ABSTRACT

The tensile, compressive, shear, bearing, fracture-toughness and axial-stress fatigue properties and resistance to stress-corrosion cracking have been determined for a total of 143 lots of commercially produced 2014, 2024, 6061, 7075, 7079 and 7178 extrusions in stress-relieved stretched tempers (TX51X), and in thicknesses from [illegible] to 6.500 in.

Tests of 34 lots in the "heat-treated-by-user" tempers were also made.

Ratios of tensile, compressive, shear and bearing properties to corresponding longitudinal tensile properties were computed. Some variations in ratios occur with respect to alloy, temper, thickness, and direction.

Groups of ratios for each alloy in the TX51X tempers were analyzed statistically and minimum-average values were determined. Tables of design mechanical properties were prepared.

Typical and minimum stress-strain and compressive tangent-modulus curves were prepared.

Average values of plane-strain stress-intensity factor, K_{Ic}, at 5 per cent secant offset were determined.

Log-mean fatigue-life values were calculated.

Stress-corrosion tests evaluated performance for the alloy and temper combinations tested.

DD FORM 1 NOV 65 1473

Unclassified
Security Classification

Unclassified

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
2014						
2024						
6061						
7075						
7079						
7178						
Aluminum						
Extrusions						
Tensile						
Compressive						
Shear						
Bearing						
Fracture-Toughness						
Fatigue						
Stress-Corrosion						
Stress-Relieved Stretched						

Unclassified

Security Classification